News and Education:
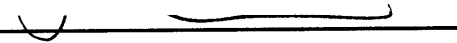# Creation of "The Classroom Chronicle"

by
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B.F.A. Photography
Tisch School of the Arts, New York University
February 1990

Submitted to the Program in Media Arts and Sciences,
School of Architecture and Planning,
in Partial Fulfillment of the requirements of the degree of

Master of Science in Media Arts & Sciences
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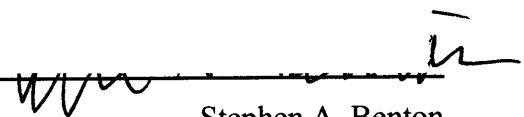Massachusetts Institute of Technology
June 1994

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News and Education:
Creation of "The Classroom Chronicle"

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Abstract

While many systems have been developed to aid in the production of newspapers at professional levels, systems specifically targeted at children have not been widely employed. A software system, NewsMaker, was developed to allow groups of grade school children (fourth grade and older) to create their own newspapers. Articles written by students can be incorporated with outside news articles from common news sources for any use the students may desire. Once articles and graphics have been selected, an automatic layout function creates hard copy output of the students' work. This thesis incorporates system description, documentation of classroom usage and student feedback.

News and Education:
Creation of "The Classroom Chronicle"

by
L. Mark Kortekaas

The following served as readers for this thesis:

Reader

Mitchel Resnick
Assistant Professor of Media Arts and Sciences
Program in Media Arts and Sciences

Reader

Jack Driscoll
Vice President
Boston Globe Newspaper Company

Acknowledgments

Thanks to Harvey and Harriet Dubner. They saw through my lack of experience and hired me on as a computer programmer. They proved to me that I could do anything I wanted to just by working hard and wanting something. And to all of the other patient individuals, especially Jim, Dave, Andrew and MaryLou, at The Grass Valley Group, thanks.

My fellow Media-Labbers: Klee Dienes for help with lots of problems; Nathan Abramson for the Dtype Library; Yasmin Kafai for general help with Project Headlight; Noah Breslow and Brian Grossman who both worked on significant sections of the NewsMaker software. A special thanks goes to Jon Orwant for many helpful hints throughout my two years here.

Michele Evard for being a rather patient and conscientious fellow researcher at Project Headlight. It is unclear if any of the results in this thesis would have been possible without her assistance. It is also a good feeling to know that NewsMaker will have a life long after I have left the lab.

The teachers and students participating in Project Headlight. Despite many initial problems with the system and network, they dealt with the problems and had a good time in the end.

My readers Mitch Resnick and Jack Driscoll for hours of editing and hints throughout the year-long thesis project.

Walter Bender for giving me the opportunity to develop my ideas, and seeing to it that I kept on track.

Roger and Cris for two wonderful years. As we head out on our own distinct paths, I am sure to remember both of you for a long time to come.

My parents for supporting me through my entire scholastic career. It is certainly clear that I saw the need for a system like NewsMaker due to my father's life-long devotion to teaching.

A special thanks to Marina for simply being there and supporting my desire to head to MIT in the first place.

Preface

Motivation

My interest in student publications stems from my personal background in newspapers and yearbooks throughout my educational career. This started with an early introduction to photography, which later became my undergraduate degree. I spent the better part of ten years working as a journalist in many capacities. During that time I was involved with the different aspects of a newspaper's production.

The most compelling feeling came from belonging to something that was going to, in some way, touch many lives. As a photo-journalist it always surprised me that people other than myself not only read the credit lines in the captions, but then recalled them and informed me how much they enjoyed a particular photograph I had created. The feelings I had came out of working with a group of highly-motivated individuals who were all working toward common goals. The responsibilities during that period have helped me adjust to needs in every aspect of my life. I believe that children will achieve similar gains if they spend time working together on news-related projects.

Overview

The foundations for NewsMaker are found in the first chapter. The development issues surrounding NewsMaker are found in chapter two. NewsMaker was used in several grade school classrooms in a Boston Public school and the results of that study can be found in chapters three and four. Only those readers who require a technical discussion of NewsMaker need read the two appendices.

Notices

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Chapter 1

Kids & News

"Contructionism is built on the assumption that children will do best by finding for themselves the specific knowledge they need; organized or informal education can help most by making sure they are supported morally, psychologically, materially, and intellectually in their efforts."[1]

1.1   Introduction

The importance of news should be taught to children at an early age so they can be more aware of the world around them. Addition is taught from an early age so that children can learn more math later on. Language skills are introduced early through reading and writing simple texts. But the news could be used to make subjects like history more interesting, for what is today's history but yesterday's news? English classes could use the news to help students read and write, while other classes could communicate to each other through the news.

To help students construct their own newspapers, a system named News-Maker was developed. NewsMaker allows for creation and editing of news along with a simple presentation step to create a printed newspaper. News-Maker can also be used as a bulletin board system, allowing local students to send messages to each other about particular topics.

NewsMaker is significantly different than most existing systems as students are able to incorporate both internal and external news information. Internal news articles are written by the students themselves, while external news is received directly from news suppliers. For final output, students select a presentation order of articles and NewsMaker automatically prints out a newspaper.

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1. Seymour Papert, 1993.

1.1.1

Why Kids & News

A recent study by the Times Mirror Center for The People and The Press, deduced that "today's young Americans, aged 18 to 30, know less and care less about the news and public affairs than any other generation of Americans in the past 50 years."[2] The study found that the interest level of the younger generation matches that of the older generation only on certain topics like sports news and the abortion issue.

If it is true that young people today are not as interested in the news as previous generations, the role of the news media on their lives cannot be understated. The role of the news media in the United States is wide spread:

- Inform — inform citizens about the daily happenings in their communities. The information passed covers a wide range of topics, from the local crime rate to the upcoming activities at the local school.

- Educate — educate the audience about what is happening outside of their local communities. This happens for things like state, national and international news, but also about longer term issues like the environment which might be important at a later date. These issues must be known by the electorate in any democracy for any election to be truly open.

- Protect — protect the population from those individuals who seem to think of themselves above the law.

1.1.2

What Do Kids Like?

As part of an exploratory study, 38 fifth-grade students at a Boston public elementary school were questioned about their conception and use of news [Eva94]. A common response to the question "What is news?", was:

> "News? I'd say news is stuff that happens mostly around the world, and when it happens people tell other people."

Logically, "Where do you get your news from?" was the next question. Responses for this question indicated that about half of the students used the newspaper as a primary source and the other half mainly received their news from television, with only a smattering of students listening to news on the radio.

The common reasons the students cited for preferring the newspaper format were:

- Quantity — The newspaper has the ability to give more details than television news due to the time restrictions that television newscasts have.

---

2. This statement was based on a 1965 Gallup poll which found that 67% of 18 to 35 year olds had read a newspaper and 52% had watched televised news the day before. The 1990 Times Mirror study found that 30% had read a newspaper and 41% had watched televised news. [Tim90]

- Accessibility — Ability to select presentation order. Several students related that they were only interested in the sports, but on the television they had to wait until the end of the newscast. In the newspaper they could skip all of the other news and go straight to the sports section. This held true of other sections of the news as well.

The students did relate some of the known problems of the newspaper compared with televised news: lack of immediacy for late-breaking news, plus the lack of moving images that a medium like television can provide. Of those students who prefer televised news, a number stated that they had a hard time reading and that when they did read the news, it took longer to read than to watch to the news.

These factors would all become an issue during the implementation of this thesis. An additional factor which would arise was that of students who spoke little or no English (some of the Spanish-speaking students listened to a local Spanish radio station for the news as this was their only outlet for news they could understand).

Most of the students wanted similar things from the news. For local news, the students wanted to be warned of danger, while international news was used for general information about other cultures. Many of the students thought that distant news was more interesting though, as they already knew what was happening around them.

It is not clear from this survey that the Times Mirror study was accurate when it stated people "care less" today about the news. Both the Times Mirror study and the fifth-grade survey showed that young people do seem to care about topics that are of personal nature. It is clear that students as a group were not focused on one news medium. They each had their own preferences.

1.1.3   **NewsMaker Approach**

From the moment of birth, children learn about the world from many different sources. Children learn from family members and, as they get older, from other children around them. In time, society brings them into the classroom for a more formal education process. Commonly, one instructs students about the world by telling the students what is important. However, simply telling students what is important falls short of creating individual thinkers.

A different educational approach encourages students to learn by constructing things in the world. This concept, "Constructionism", was originally developed by Seymour Papert as part of a belief that people construct new knowledge best by constructing personally meaningful object. These objects can be as varied as "a sand castle on the beach or a theory of the universe." [Har91b] [Har90] [Pap93]

Some of the ideas which make up Constructionism can be found in the computer programming language Logo. Logo is a simple programming language

which students can use to create geometric shapes and procedures which they and others might interact with. The hope is that the students will learn about geometric concepts by constructing their own worlds from geometric shapes, long before they ever open a geometry book. These worlds go beyond the computer screen and into the physical world with systems like Lego/Logo. [Res92]

Given this framework, might it not make sense to have students learn about the news through a system which allows them to construct their own news? It is the hope that a news construction system, like NewsMaker, might allow students to both have more access to the news, but also the ability to build their own news in the process.

1.2 Related Projects

NewsMaker is not the first attempt at getting students more involved with the news. Students have been making their own newspapers in formal school programs for a long time, while the news media is also focusing programming on the younger generation.

1.2.1 Student Newspapers

Clearly the more a person is involved with an issue, the more interest and knowledge he or she will have on that issue. One common way students are introduced to the news is through school newspapers. When students start working on organized school newspapers depends a great deal on their school system. Typically, high schools in the United States have a school newspaper in one form or another.

The student newspaper is an excellent way to learn about issues which affect the reporting of the news: accuracy, context, points of view, etc., but these lessons are not taught to students outside of the newspaper. These students are already interested in some aspect of the news as they have taken it upon themselves to join a student group and are interested enough to spend their own free time on the newspaper.

What about the larger majority of students who are not interested in joining the newspaper. How do they go about learning about the news? Most schools are not equipped to give students a critical study of what makes up a good news story. These students are never given the opportunity to realize how the news can affect them or even how to personally access the news.

1.2.2 News for Kids

The idea of targeting young audiences by the news media is not a new one. During the 1950's teenage newspaper sections were common. These sections all but disappeared for most of the 1960's, 70's and 80's but have recently been brought back by a news media attempting to get audiences interested earlier. Newspapers such as *The Boston Globe*, *The Syracuse Herald-Journal*,

The Chicago Tribune, The Detroit Free Press, The Wall Street Journal, among others, all bring regular sections aimed at younger audiences to print each week.

The Boston Globe produces two weekly sections aimed at young Boston readers. The "Funpages" section, a four-page section with editorials, essays, interview, advice and letters, has been produced by local elementary school classes as part of the Sunday comics section. In 1993, the Globe added the "Student Newsline" which provides general news and articles of interest to children and is published as a page in the regular newspaper each Monday. The articles are both written by members of the Globe staff and by local children.

The Syracuse Herald-Journal provides two weekly sections which local high school students help produce. Issues range from reviews of the local restaurants to birth control. A weekly edition, "hj" is added to the Thursday evening edition of the paper with extra copies going to local schools and other places where children might be found. A Saturday edition was added, "hj Saturday", which is a single page of the Saturday newspaper.

This trend of targeting children is not limited to the print media. Television networks such as Turner Broadcasting and Nickelodeon have entire news programs dedicated to young audiences which are in part produced by the children themselves. The topics covered in these national broadcasts tend to be wide-ranging, but local cable companies work with local groups to produce content which can be found on cable access channels.

Since 1990, WBZ Radio in Boston has produced a two-hour weekly broadcast called "Kid Company", which is targeted at children ages 8-14. This broadcast is written and produced by children trained how to write and communicate their ideas through the spoken word. With the recent addition of an electronic mail address, the radio station hopes to promote even more communication between the listeners and the child producers.

While there are many different programs directed at the young today, the one thing that seems to be found in all of them is the idea of using the children as a producer of the news. [Lei93] [Mar94] [Mat93] [Rei91] [Ros91]

1.2.3   Electronic Newspapers

The news media is undergoing a transformation to see how computers will affect their long-standing businesses. This media shift can be used in educational settings to provide students with a better view of the world around them.

As part of the Journalism School at the University of Missouri, a project known as *The Daily Missourian* has been undertaken. Its purpose is to provide local schools with a daily electronic version of the university's school newspaper, *The Columbia Missourian.* Journalism students at the university create the articles which are then downloaded to the schools each evening. The elec-

tronic newspaper is customized to the school setting in which it will be viewed by young students, providing both text and graphics.

In addition to the use of local, state, national and international news that is provided by the university, the young students have the ability to write and submit articles for inclusion in the next version. The university works closely with the schools to ensure that the students and teachers are getting what they want from the news. [Zem93]

1.2.4 MUDs and Long Distance Communication

Multi User Dungeons, or MUDs, are commonly used on the Internet as a type of role-playing game. Since their development in the late 1970's, the view of MUDs has started to shift away from the idea of a MUD as a game towards MUDs as useful communication tools. MUDs have the ability to have many users (thus the "Multi User") all using and communicating on a single system at the same time from anywhere on a computer network. However, MUDs have at their base the idea of rooms in which characters can move about. This allows people to move off into separate rooms to have private conversations.

For some, this shift away from role-playing games has promoted MUDs specific to group communication when all individuals cannot be in the same place at the same time. Others have built in new tools such as internet navigation and large group-ware project bases. [Eva93] One idea implemented at the Media Laboratory at the Massachusetts Institute of Technology, MIT, placed a customized newspaper into a MUD, which allowed users to communicate with other members of a group while reading their newspaper at the same time. [Kay92]

The reason MUDs can be adapted to these different needs as wanted is their ability to be programmed both at the application and at the user level. This ability to have users create their own worlds is one reason that MUDs are popular. Certainly these ideas can be used in an educational setting as well, allowing students to communicate with each other in a world which they have built.

It would be possible to create a MUD incorporating news information for the classroom. While MUDs are a decent way to communicate with users who are not in the immediate area, they are not as good as striking up a conversation with the person in the next room. Since part of NewsMaker's goal was to create a news system for a single site, use of a MUD did not make a great deal of sense. Had the goal been to create a communication system between different schools, a MUD might have been a good way to proceed.

Chapter 2

NewsMaker Design

NewsMaker is a software system specifically designed for reading, creating and printing out news information. All articles available in NewsMaker are shared by all of the users.

2.1 NewsMaker

NewsMaker helps students construct their own newspapers by allowing them to work on the important points of what they feel news to be:

> "News? I'd say news is stuff that happens mostly around the world, and when it happens people tell other people."

- Event — The students are able to find and relate events that occur around them to the rest of the world.

- World — The use of outside articles is a key aspect of NewsMaker. While students get news from more traditional news sources, e.g., magazines, newspapers, radio and television, providing raw news information to the classroom has not been widely implemented.

- Telling — Choosing which articles to include and which to exclude, editing those articles, and finally selecting a priority for them are valuable lessons. These lessons will aid group participation and inter-personal communication skills that go along with the duties. There are other side benefits. Students become more informed about what is going on in their communities and the world. By working in groups, students teach one another during discussions that arise from reading articles written by others. NewsMaker can help enhance writing skills by making students see that the way you write is just as important as what you write about.

NewsMaker was conceived and developed entirely as an application which could be used in a classroom environment as a tool students could use to access and manipulate news information. Once the initial goal had been established the following guidelines were created as a development framework:

- Outside News — External news sources should live in conjunction with articles created by the users. Users should be able to use information from

major news services in any form the users desire.

- Article Creation — Articles of interest may be written by any user.

- Article Editing — Articles must be editable as needed.

- Searching — Need to search to find articles on a particular topic.

- Presentation — Simple layout scheme works on a priority basis and automatically creates output with the look of a typical newspaper.

- Article Storage — Common storage so that all members of a user group have access to the same information easily and readily. All article types (both text and graphics) should be accessible via the same mechanism.

2.2   Outside News

While research is still being undertaken into exactly what sorts of information interest young children, it is known that the children growing up today are surrounded by images of world events all the time. If NewsMaker is to be successful at getting children more involved with the news, access to local, national and international news must be provided.

Numerous news groups[1] can be created, allowing the local site to be customized for the needs of the users. The choice of incoming articles can be based on classroom curriculum, teacher projects or best yet, user requests. These news groups are individually maintained for each NewsMaker site.

As the user site does not have the capacity to capture and store news feeds in real-time, a central site will capture and store all of the required data. Each night NewsMaker automatically downloads the articles and stores them on the local network so that by the time the users arrive, NewsMaker contains the current news.

---

1.   The NewsMaker server structure has the ability to save articles under different headings. In many news organizations, these different headings are referred to as "sources". However, for the purposes of NewsMaker, the USENET concept of a "news group" is more applicable. [Keh94]

The news groups are created when related articles are brought in from outside, i.e., articles about national news would be stored in one news group and articles about international news would be stored in a different news group.

Local users also have the ability to create new news groups as desired by speaking to the system administrator.

A note about terminology: multiple users work in a "user group" from articles found in a "news group".

2.3   Article Creation

The best individuals to communicate what happened at yesterday's fifth grade soccer game, or the upcoming field trip to the local museum, are the participants themselves. NewsMaker allows users to add their own articles to the server, and gives other users instant access to the new articles.

As this step is crucial to the success or failure of NewsMaker, steps were taken to ensure the ease of article creation. The local computer network gives NewsMaker the user name, and date and time stamps tell NewsMaker how old articles are. The only information the user has to provide are the headline and the written text. The NewsMaker window was designed so that both the headline and the body text are near each other. Switching from the headline to the body and back again is accomplished with a simple mouse movement. Users are prevented from saving an article without a headline or body.

2.3.1   New

Users have the ability to create an article in any news group which News-Maker maintains. There are two distinct types of news groups:

- News — The articles in this news group are all related news articles. These can be either news from external sources, or articles the users have written.

- Question — The articles in this news group are all related questions and answers. For instance, a group of users might be working on the same class project, but might not be able to meet together. By using NewsMaker, they are able to post questions and answers to the news group which the other users are able to see and respond to.

Once saved, these articles are made instantly available to the rest of the users in NewsMaker.

2.3.2   Reply

In those cases where users are using NewsMaker to communicate to each other, users will want to respond to (or answer) questions in the news group. For these occasions, NewsMaker has a reply function which allows users to respond to a question. The reply function leaves the original question in place and the user appends on their own comments. Upon saving the article is posted to the news group.

2.4   Article Editing

The editing of articles, either from internal or external sources, can be done by the users, or by staff members.

2.4.1   Edit

Once an article has been created or imported into NewsMaker, it might be necessary to edit the article. This might be needed for any of the following reasons:

- Completion — Most of NewsMaker's users will only be able to use NewsMaker for a short period of time each week. As such, there a good chance that an article the user might be working on cannot be completed in a single session. By saving their work and coming back another day to finish it, users are freed from the time limits imposed by the classroom environment.

- Spelling/Grammar — As the users write their own articles, there will be times when a change is necessary before printing the final copy.

- Incorrect — Users might write an article which contains incomplete, or even incorrect facts. It is part of the learning process to make mistakes, and it is certainly expected that errors, both factual and deliberate, will be made.

- Length — Users might wish to limit the extent of any article to make it more readable to the audience they are trying to reach.

There will be many other reasons an edit will be required, however, these are the major reasons. Users are given their own security level, which determines the level of editing allowed on articles. In addition, copies may be made of external articles which users can treat as their own.

The editing screen is exactly the same as the text screen. The user tells News-Maker to enter edit mode, and changes are allowed to the text. No changes may be made to text when the user is reading an article.

2.4.2   Edit History

While articles may be edited by any individual, what if an article is written by one user and is then changed by another? This is the way organizations such as the Associated Press work. Any member paper can edit any article that comes down from the news suppliers as needed.

NewsMaker allows for editing, but it is possible to isolate an author if editing is performed incorrectly. Editing performed to an article is tracked, with the name of the editor included. All old versions of an article are available at any time.

The assumption is made that the external news groups are all accurate, but once again, what if a user decides to change the meaning of an article about someone? While this is allowed, NewsMaker makes note of this on the final output so that the end-reader knows that the article has been altered by one or more users.

These issues bring up the question of how users come to trust the news, something that is clearly important to all members of society. Issues such as these will be brought to the attention of young children who will hopefully recognize that the news is only one person's observation of an event and is subject to change with only a few key presses.

2.5   Searching

Providing a wide base of information is not enough. It is necessary to search through articles to find what the user wants. For instance, if the entire Knight-Ridder news feed is used, how will the users find an article on their favorite baseball player, or information on what the President of the United States did this week?

To accomplish this, NewsMaker generates a list of keywords for each article which the user can search on. The keywords are a list of common words which appear in the article. These keywords are generated with a process which indexes each word in the article, taking into account common words, i.e., "a", "an", "the", etc., and gives each word a ranking. NewsMaker then takes the top twenty words, based on the index ranking, and stores these with the article.[2] [Sal89]

2.6   Presentation

Once articles and graphics have been found and created, it will be necessary to put the elements together and print them out. This is usually done by a person using a page layout system, such as Aldus's PageMaker, who sits with all of the articles and graphics, sizes them and places them onto a page. These layout tools certainly have their uses, however, given the limited time the users have, a better tool would be an automatic layout scheme.

At the MIT Media Laboratory customized papers are routinely printed out which have never been touched by a human designer. In the MIT case, all articles are chosen by a user modeling system and pulled out of the news server; then a layout routine takes the articles and does all of the layout automatically to either hard copy or to a screen. [Ben91] Since NewsMaker users do yet have a focused need for the news, the user modeling system will not be that useful. The automatic layout utility, however, is a useful tool which can be applied.

---

2. Articles the users create during the day are not part of the searching routines until the next morning when NewsMaker rebuilds the searching lists.

Because the layout portion of NewsMaker will remain hidden, NewsMaker will take article order preferences from the user. With this information News-Maker will automatically layout the articles and print out a newspaper.

2.7 Article Storage

A server architecture was needed which would allow access to multiple news groups with minimal memory and speed restrictions. Typically, news servers are built on a client-server architecture. This basically entails a dedicated server process sitting on a machine which takes requests and returns results to the various clients. From a number of points, this would have been the best approach for NewsMaker, especially for speed and versatility.

Instead of having a dedicated process waiting for client requests, another server architecture is disk-resident. The news data is saved on a network drive which all users have access to. This has the advantage of network compatibility, as different computer networks have different ways of accessing data from clients. For instance, processes on a TCP/IP network would make requests through a TCP port, while processes on a Novell network might make requests through the NetBios level. [Gas93]

Most networking systems have the ability to mount remote disks on a server as if they were on the local machine. With this in mind, it became clear that the best way to make NewsMaker compatible with all available network technology was to create a server architecture which was disk resident.

2.7.1 Drawbacks

There are certain drawbacks to the disk-based architecture which NewsMaker employs:

- Speed — Each machine must create a copy of the server structure in memory, which takes more time than if the server architecture were created and stored once in the memory of a server process.

- Versatility — The server architecture is only seriously modified each morning, when a dedicated process takes charge and re-adjusts the entire server. Currently, any clients who might be using NewsMaker at this time are shut down to avoid any memory problems.

- Queries — Cross-article search indices are built up only in the morning. This has the effect of limiting searches to what was in the server that morning.

- Overwriting — Since no one process is in charge of the data at any given time, it is remotely possible for two clients to overwrite each another.

2.7.2   **Advantages**

Given the disadvantages, what would convince a developer to go with the disk-based service of NewsMaker:

- Speed — The users are elementary school children who do not normally have access to any external or internal news groups. The fact that a server request might take a fraction of a second longer (for most requests) is not an issue.

- Versatility — The school environment does not allow a real-time connection to the news groups. For instance, to have access to the major news suppliers requires dedicated phone lines, and in some cases a satellite dish. These requirements are simply not practical for most school districts. NewsMaker takes advantage of real-time servers at the MIT Media Laboratory and only downloads new data in the middle of the night. The only data which gets posted to the server during the school day are the articles created by the users.

- Queries — Keyword searching is not necessarily the best way to look for an article, but it is a functional method. The fact that articles created by the users might not be cross-referenced during the day is not a big issue since there will be plenty of data for the users to search on.

- Overwriting — The odds that any two users would post an article at exactly the same second are unlikely, given the usage level in the school environment.

The details of the server architecture which NewsMaker uses can be found in the appendix "Server Structure" on page 61.

2.8   **User Tracking**

For the purpose of calculating which news groups are used by the users, NewsMaker has a tracking routine. NewsMaker tracks each article request with a time stamp. For the purpose of the documentation in this thesis, none of the time information was used.

2.9   **Platform Issues**

NewsMaker could be implemented on any computer system. The decision to use the Microsoft Windows operating system was made based on the availability of a classroom site which could be used by researchers at the MIT Media Laboratory.

Chapter 3

Implementation/Analysis

NewsMaker was designed as a multi-user classroom news system. NewsMaker was brought into several elementary school classrooms to achieve two related goals: determine NewsMaker's effectiveness; try to see what types of news interest the students.

Overview

- Over 100 fourth and fifth grade students used NewsMaker during a two-month period for various classroom projects.

- One classroom used NewsMaker to create newspapers. Another classroom used NewsMaker as a on-line forum for exchanging questions and comments with each other.

- Students read articles written by themselves and their classmates considerably more than the articles written outside of the school.

- Of the articles from outside news sources, the students read the most articles in the "Entertainment", "Sports" and "National" news groups.

- Of the articles the students wrote, the most popular topics were: "Video Games", "Classroom News", "Entertainment" and "Bilingual".

3.1 Project Headlight

During the 1984-85 academic year, a collaborative project involving the IBM Corporation, Boston Public Schools, and the MIT Media Laboratory laid the foundations for a "model school of the future" at the Hennigan Elementary School, an inner-city public school in Boston.

Project Headlight began operations in September, 1985, and was conceptualized and designed in the mid-80's in anticipation of a technology-rich future, with far more extensive computer use than existed in schools during that period. Headlight, however, was never defined as a "technology project," but as a constructionist project on learning and education with technology. The main goals of Headlight were: advance educational reform; bring to the forefront ideas related to math and science education, information sciences, and

technological fluency. Another set of goals included the development of methods for both implementation and research of the growth of a computer culture in a technology-rich school setting.

Figure 1: Project Headlight Computer "Pod".

During 1985-1992 the project used approximately 125 IBM PCjr computers, all equipped with LogoWriter, and placed in the open areas next to the class-rooms (the "computer pods"), in the classrooms, and in the teachers' homes. Most of these computers are linked by a local-area network. During the summer of 1992 an equipment grant was provided by IBM which replaced the PCjr computers with IBM PS/2 Model 25s all on a IBM Token Ring Network. [Har91a]
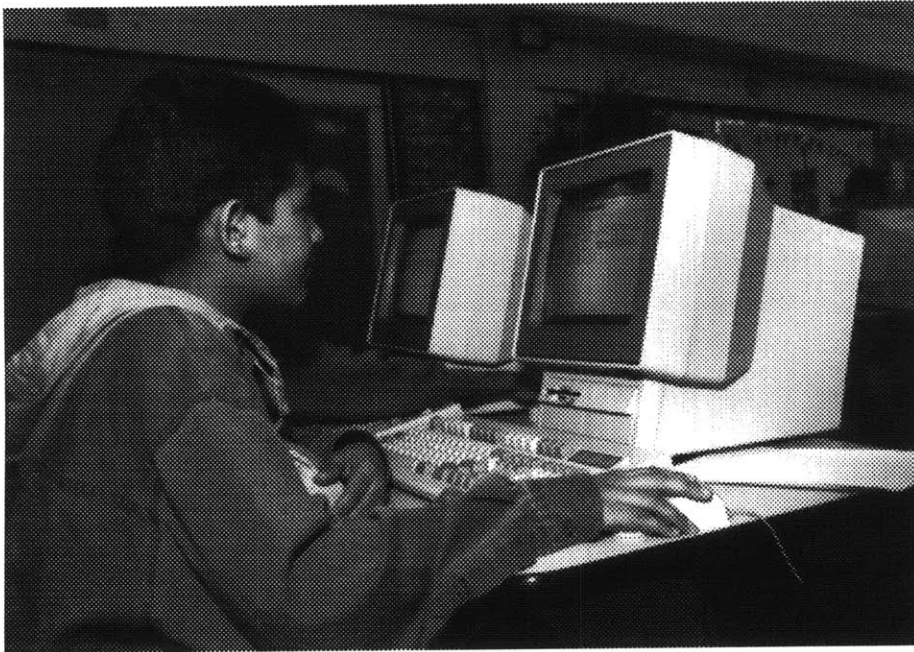
Figure 2:   Student Using NewsMaker

During March and April of 1994, one fourth and five-fifth grade classrooms participating in Project Headlight were selected to work with NewsMaker in various fashions. One of these classes was dedicated to producing individualized newspapers, while the others used NewsMaker for other projects.

3.2   Newspaper Project

The fifth-grade class which used NewsMaker specifically for producing individual newspapers consisted of nineteen students (ten boys and nine girls). This class has the designation of being an "integrated classroom", meaning that one half of the students were standard track students, while the other half were special education students. The project met twice a week (one hour each session) for roughly seven weeks. The classroom time used was from regularly scheduled computer time, so the students would have been using the computers for the same period of time with or without the newspaper project.

The project was introduced to the students with a discussion of the types of news they were interested in and what they felt about the news. During this initial session discussion ran from how the news is classified into topics (i.e., Local, National, International, etc.) to freedom of the press (not originally planned as part of the session, this was something that one of the students brought up).

After the initial discussion, the students were introduced to NewsMaker. The first day of use was by far the most frustrating for the students, due in large part to the use of the operating system, Microsoft Windows, and the mouse, since many of the students had never used either before. The students were directed to find articles they were interested in, and given instructions as to where the articles might be located. The first several sessions were spent just having the students use NewsMaker to find news of interest.

Once the students were familiar with the operation of both Windows and NewsMaker, a dedicated news group was created for the project. Entitled "Classroom News," members of this class were told to use this group for placement of their own articles. Several weeks followed, during which the students used NewsMaker to write about their talent show, activities around the school and homes, as well as other topics.

During one class session several weeks into the project, the students took a field trip to *The Boston Globe*. The students were shown the presses and the newsrooms in the facility with the hope that they would relate to the news better.

3.2.1 Examples

A majority of the time the students spent reading and writing articles in News-Maker. During the last several sessions the students were able to print out their own newspapers on laser printers. Examples of the types of newspapers the students created are found on the next several pages.[1]

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1. The names of all of the students have been changed for the purpose of this document. However, the gender of the assigned names does match the gender of the student, since that may be relevant to some readers.

MICHELLE'S NEWSPAPER

Editor: Michelle   **1:10 PM — Thursday, April 28, 1994**

Gang Members and Violence

Michelle
Classroom News
April 6, 1994

These days you really can't go no place and say nothing To no body cause if you say anything smart you will end up get stabbed . Just like yesterday me and my friends was walking by and these boys was sitting in a car and one of the boys .got out the car and asked me if . I smoke and i said no and he said you smoke reefer and i said no and he said want up with the no and i kept on walking and i weant and told my mother and she said don't ask my dame child don't ask her

HOW MOTHERS TREAT THEIR KIDS THESE DAYS!

Michelle
Classroom News
April 27, 1994

There once was a mother who took her child ....and beat her child on the heater.
The girl was crying out the window and her mother kept on beating her.   Then some of my friends and I walked by and like two min later we come by and five0 was there and the girl was having asthema attack and the ambulance came .and the news was there and they had nothing to do with it . and the people was going to put her in DSS and the mother is going to go to jail.The girl live in Mission Hill and this happend in the middle of march,1994.and she was about 13or eather12 one of them that one of the st
ory about how a.

Figure 3:   Michelle's Newspaper

THE BIG PLAY

Editor: Roger   **1:10 PM — Thursday, April 28, 1994**

WHAT WE'RE DOING FOR THE SCIENCE FAIR.

Roger
Classroom News
April 27, 1994

WE ARE STUDYING DINOSAURS .
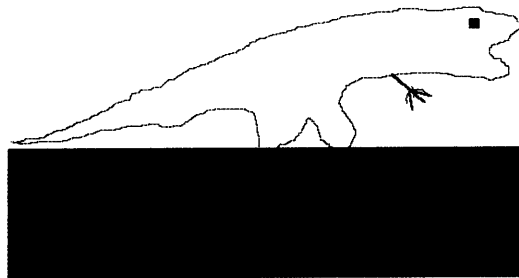
Dinosaurs on the prowl

HOW FOSSILS ORIGINATED

Michelle
Classroom News
April 27, 1994

THE RECORD OF LIFE ON EATH GOES BACK MORE THAN A BILLION YEARS . THE EARLY PART OF THE RECORD IS EXTREMELY SCANTILY AND DIFFICULT TO READ OVER THE PAST 500 MILLION YEARS . HOWEVER STARTING IN THE CAMBERING ERA OF THE EARTH'S HISTORY MANY PLANT AND ANIMAL REMAINS HAVE BEEN PRESERVED. FROM THESE REMAINS THE EVOLUTIONARY HISTORY OF LIFE HAS BEEN WORKED OUT . IT IS AMAZING THAT SO MUCH HAS BEEN DISCOVERD WHEN ONE CONSIDERS HOW VERY REMOTE ARE THE POSSIBITIES THAT EVEN FOSSILIZED MATERIAL COULD SURVIVE THROU GH SUCH ENORMOUS PRIODS OF TIME . MOST ANIMAL FOSSILS ARE THOSE OF CREATURES THAT DIED AN ACCIDENTAL DEATH IN SUCH A WAY THAT THEIR BODIES WERE QUICKLY.

Figure 4:   Roger's Dinosaur Newspaper

Paula Paper

Someone Getting Shot By Paula

Paula
Classroom News
April 6, 1994

The other night me and my sister were in our room and then we heard two different kinds of shotguns, but we didn't pay attention because people are lways shooting around emptying out there guns like nothing, but when we heard somebody yell out   Ahh we got scared.

My big sister looked out the window and she seened a   body laying down in the middle of the basketball court.   My sister got scared and called my   mother and my father. My father looked out   the window and   seened the body laying on the floor and he told my mother to call the cops and the ambulance and she did. The ambulance came but before they came my father went downstairs   to check   how was the boy was doing.   But my father didn't touch him.   My father didn't   know the guy had a gun on

him, but when   the police   and   the ambulance came they told my father to get away   from the boy.   They asked what happened   to the boy.

My father told them what happened.   The ambulance checked his palse.   Then they yelled out the boy was   dead.   Everyboy was sad. The police stayed in the basketball court all night, but they didn't find any clues.

A NEW BABY BY PAULA

Paula
Classroom News
March 18, 1994

`   My sister Michelle is having another baby. It's going to be a girl.
She's going to be born in April. But she already has a daughter. Her name is

Jasmin. She's only one year old. Her birthday is October 3. I thought the new baby was going to be a boy so I got him a black and white suit for church. But   now I know it's a girl. I have to buy her a

dress for church. I call my sister a big bowling ball because her stomach is so big. She starts laughing.   I   hope my sister calls her baby Diane.

Figure 5:   Paula's Newspaper

Sally and Susan Newspaper

Editor: Susan   **4:10 PM — Monday, May 02, 1994**

HOW DRUGS AND AIDS ARE KILLING PEOPLE IN THE 90's

Susan
Classroom News
March 25, 1994

TODAY, TOO MANY PEOPLE ARE USING DRUGS AND KILLING THEMSELVES AND THE TAKING THE LIVES OF OTHERS . THESE DRUG USERS ARE GOING AROUND TRYING TO GET LITTLE KIDS AS WELL AS OLDER KIDS TO USE DRUGS .

MOST OF THE USERS ARE EVEN KILLING THE SELLERS SO THEY CAN GET THERE DRUGS. TOO MANY PEOPLE ARE HAVING SEX WITH OUT USEING CONDOMS TO PROTEC THERE SELF'S FROM GETTING AIDS . SOME OF THE YOUNG GIRLS ARE HAVING BABYS AND GETTING AIDS MOST OF THESE GIRLS THAT ARE HAVING BABYS DON'T EVEN HAVE JOBS OR MONEY TO SUPPORT THERE BABYS WITH FOOD OR CLOTHES.

Cholesterol drug works for women, too

Ron Kotulak and Jon Van, Chicago Tribune
Classroom News
March 28, 1994

The cholesterol-lowering drug lovastatin has been found to lower the risk of heart disease in men. Now a new study shows that women also can benefit from the drug's protective effect.

A two-year study of 331 patients, of whom 62 were women, showed that low doses of lovastatin worked equally well in males and females to retard the progression of fatty deposits in coronary arteries and to prevent new ones from forming. Dr. David Waters reported in Circulation, a publication of the American Heart Association.

"For a long time, many physicians felt there was not enough data on women with high cholesterol levels, and we didn't know what to do about drug treatments for such women," he said. Waters, who conducted the study at the University of Ottawa Heart Institute, is now at the University of Connecticut in Farmington.

New coronary blockages occurred in only 4 percent of the women taking lovastatin compared with 45 percent of the women taking a placebo, Waters said.
X X X

NEW TECHNIQUE OFFERS SAFE INTERNAL IMAGES

A safe way of visualizing what's going on inside the human body without the use of radiation or confining a patient inside a giant magnet has been developed by a biomedical engineer at Rensselaer Polytechnic Institute in Troy, N.Y.

Jonathan Newel says his new invention measures different electrical properties of tissue, which can be converted into real-time images of changes occurring in the lungs, blood, brain, heart and other organs.

While the new technique, called adaptive current tomography, does not provide images as good as those from machines using radiation or magnetic fields, it does not involve the use of X-rays and other radioactive materials, Newel said. Furthermore, the new technique can be used continuously to monitor bodily functions, he said.

The first use of the device may be to monitor patients for potentially deadly accumulations of fluid in their lungs, he said. Other uses may include early warnings of blood clots and fluid build-up in the brains of premature infants.
X X X
PHOBIA EXPERT TREATS

"BASHFUL BLADDER"

As many as 10 percent of men may suffer from the "bashful bladder" syndrome, an inability to urinate freely in public restrooms, researchers suspect.

"There's nothing wrong with these people medically," said Joseph A. Himle, a phobia treatment expert at the University of Michigan. "But their anxiety about being around others interfers with their ability to urinate."

The disorder, which apparently runs in families, varies in severity, he said. In the worst cases, it results in people becoming unable to leave their homes. Treatment requires patients to use several restrooms in the Michigan medical center, starting with small ones that are out of the way and gradually moving to ones that are more widely used.

The therapist at first stands outside the restroom to assure that the patient will have total privacy. As treatment proceeds, the therapist forces the patient into more realistic situations.

"I might even fidget around or make nasty comments about how long it's taking, or even bump against the patient to simulate a real-life situation," Himle

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Figure 6:   Susan's Newspaper — Page 1

Continued from Previous Page

said.

Graduation from treatment requires the patient to use the restroom at a Michigan football or basketball game, he said.

X X X

OVERNIGHT CONTACT WEAR PROVES RISKY

Of the 12,000 cases of contact lens-related ulcerative keratitis that occur each year in the U.S., an estimated 6,000 to 8,000 of these cases may be caused by wearing contact lenses overnight, a Johns Hopkins study has found.

With an estimated 24 million Americans using contact lenses, the risk of this type of infection is relatively low and the infection can be effectively treated, noted Dr. Peter Donshik, of the University of Connecticut Health Services Center and a member of the board of the Contact Lens Association of Ophthalmologists.

X X X

TRACKING SHORTCHANGES AVERAGE STUDENTS

Placing high school students either in college preparatory courses or easier science and math classes — a procedure known as "tracking" — may be shortchanging the educational aspirations and achievements of millions of young Americans, according to a Stanford University study.

Studying 1,200 students in six diverse San Francisco Bay Area high schools, Sanford Dornbusch found that while tracking doesn't limit the opportunities of the top 10 percent of students, it can be disastrous for students who fall in the middle range.

Among students who had high educational expectations and who thought they were in the college-prep track, almost half of the African-American and Latino students were not in college-prep math and science courses, as were 20 percent of white and Asian-American students, he said.

"This finding upsets me," Dornbusch said. "This set of data points to a systemic pattern of ignorance, and African-Americans and Hispanics are even less aware of the extent to which the tracking system is shortchanging them."

Principals and teachers often do not tell students which courses are college-prep, he said. Instead, students are assigned to such biology courses as "Ecology and You" or "Life on Earth," and to business math or courses that some teachers call "bonehead math," he said.

Figure 7:   Susan's Newspaper — Page 2

Sam and Vacations

HOW PEOPLE GET MUSSLED BY PAYING FOR CHIPS

Mark
Classroom News
March 18, 1994

THE WORLD LOVES CHIPS! WHEN THE POTATO CHIP BAGS GET EMPTY SOME PEOPLE GET HUNGIER AND SO THEY GO TO THE STORE AND BUY MORE CHIPS AND POSIBLY BUY A SODA BECAUSE THEY GOT SO THIRSTY FROM ALL THE SALT. THAT'S HOW STORES GET RICH OFF OF PEOPLE.

KIDS LOVE CHIPS BECAUSE IT'S A GREAT SNACK. WELL, WE HID A SMALL CAMERA IN A LITTLE BOY'S HAT AND WE WENT UNDERCOVER TO SEE WHAT KIDS DO WHEN THEY GO TO THE STORE AND BUY CHIPS. WENDSDAY MORNING A TEEN AGE BOY WENT TO BUY CHIPS [DORITOS] AND HE PAYED 50 CENTS FOR THEM. WHEN HE GOT HOME TO EAT HIS BAG OF CHIPS HE STUCK HIS HAND

INTO THE BAG AND THERE WAS NOTHING BUT AIR THE BAG OF CHIPS WAS EMPTY FIFTY CENTS BAG OF CHIPS DOWN THE DRAIN HE WENT BACK TO THE STORE AND COMFRONTED THE OWNERS OF THE STORE ABOU T THE INCEDENT AND THEY GAVE THE BOY BACK HIS FIFTY CENTS AND THEY SAID CHECK YOUR BAGS BEFORE YOU BUY THEM.

VACATIONS

Sam
Classroom News
April 27, 1994

When it the last day of school everybody was haapy.Everybody got on the bus and was excited.Some people went to another state,some spend the night at one of their relatives

house,and some stay at their house.The best part about vactions is you can get to stay up late,go over your friends house and come home anytime you want. You can do anything on your vacation.When ever you your in school Friday is really the vacation because you can stay up late and go over

your friends house and come back when ever you want.Vacations are the best things.You can do anything you want.Sometimes you go to camp. Camps are good.They got fun games at camp.Vacations are alot of fun.I can't wait for the next one.

Figure 8:   Sam's Vacation Paper

Interestingly, the newspapers the students prepared all tended to have a lack of external articles, even though they were told to create a newspaper which contained at least two internal articles and at least one external article. In the five examples above, only Susan made a newspaper which contained external articles. She was writing a newspaper on the use of drugs and started with her own article about drugs. She then found an article which talked about a new drug which combats cholesterol levels and used these two articles to form her newspaper.

Part of this could be attributed to the time the students were able to use News-Maker, since writing takes a good deal of time for the average fifth grader (most of the short articles in the above newspapers took each student almost a full hour to write). Even so, it is a quick process to find articles and use them in a newspaper if the student wants to.

3.2.2 Student Feedback

At the conclusion of the project, several students were interviewed regarding their feelings about the project they had just finished.

Michelle was the student who during the first day of the project had mentioned that frequently the news media just got their facts "messed up" since they did not know the whole truth. She stated several examples of recent events at her housing project which went to prove her hypothesis, where the news media had given out the wrong facts and had not bothered to search deep enough to find the truth. Michelle tended to write about "hard news" events she had witnessed recently, with a slant towards gang violence, drug usage and even child abuse.

Michelle liked using NewsMaker but did not think she had enough time to work on her news articles. She enjoyed the fact that students were allowed to write about anything they wanted to, since she thought that everyone had a different story to tell. She also restated her feelings that the news media did not know the whole truth, and by writing it herself she could get the truth out. She thought that NewsMaker was good for having other students write about their experiences and to tell other people about them. She did not think that writing was the only way to do this. Talking to people just around the classroom would be enough. She recognized that she was most interested in articles about drug use and violence and that she looked for them in the newspaper and on the television news.

After the first few sessions it became clear that using text articles was not going to be successful with all of the students. Some of the students simply did not like to read, others liked to read but not to write, and others had very limited reading abilities. It had been part of the design of NewsMaker from the start to incorporate graphics, but for the purpose of illustrating, not to compensate for a lack of ability reading and writing. Interestingly, those students who did not like to write had the ability to draw using either pen on

paper or the drawing tools on the computers.They took it upon themselves to create graphics for the written articles their fellow students were producing.

Roger stated that he enjoyed using NewsMaker to create images[2] since he does not like to write (although in his case it has nothing to do with ability). Roger normally gets his news from the television (since the newspaper costs money that he does not have), but does read the newspaper sometimes if it is around. He used NewsMaker a good deal since he enjoyed using the computers and did not want to lose the computer time. Consistent with his love of images, he stated that NewsMaker should have more images in it.[3]

For some of the students the idea of being able to write anything of interest to them was enough, but in Paula's case she needed a bit more attention and prodding. Given a topic to write on, she would take it and run with it, often sitting quietly by herself occupying an entire session writing one article. She liked being able to print out her newspaper to show to her sister, especially since her sister is going to have a new baby soon, which she wrote about in her newspaper.

In addition to the "Classroom News" news group which the students in this class used to store articles in, other news groups were created for students to use. All of these were based on a particular topic, ranging from "Announcements" to "Video Games."

Sam was another student who enjoyed using NewsMaker for creating images, but unlike Roger, Sam seemed to enjoy writing as well (simply based on the lengths of the articles he created). However, instead of writing articles in the "Classroom News" group, Sam enjoyed the "Video Game" news group the most. He was able to see what others thought about video games and he could write his own impressions as well.

3.2.3   **Usage Levels**

In order to track the popular news groups, each time a student read an article a log was kept of the transaction. At the end of the project, a tally was created which showed the total usage for each of the news groups. The usage levels showed that the students were, by far, more interested in the articles which

2.   NewsMaker does not have any internal graphics capabilities except for viewing. Students used the standard "PaintBrush" program which is shipped with all copies of Microsoft Windows. However, since the interface for Windows and NewsMaker is the same, the students thought image creation was simply part of NewsMaker. Once the students had created their articles in PaintBrush they would import them into NewsMaker, where they could then use them with text articles.

3.   The only images in the NewsMaker server at the school were those created by the students; no images were ever transmitted to the school. In the future, an image source should be used to augment the text articles in the server. These images could be used as an activity to have the students find an image they like and then to have them find more information on the same topic from the text articles.

they or fellow students wrote (the "Internal Articles") versus the articles from the outside (the "External Articles").

These students read the internal articles just over twice as much as the external articles (411 to 194). This fact is significant since there are many more articles in the external groups than in the internal (approximately 700 to 200 on an average day). Due to this, the results are separated out for external and internal news articles.[4]
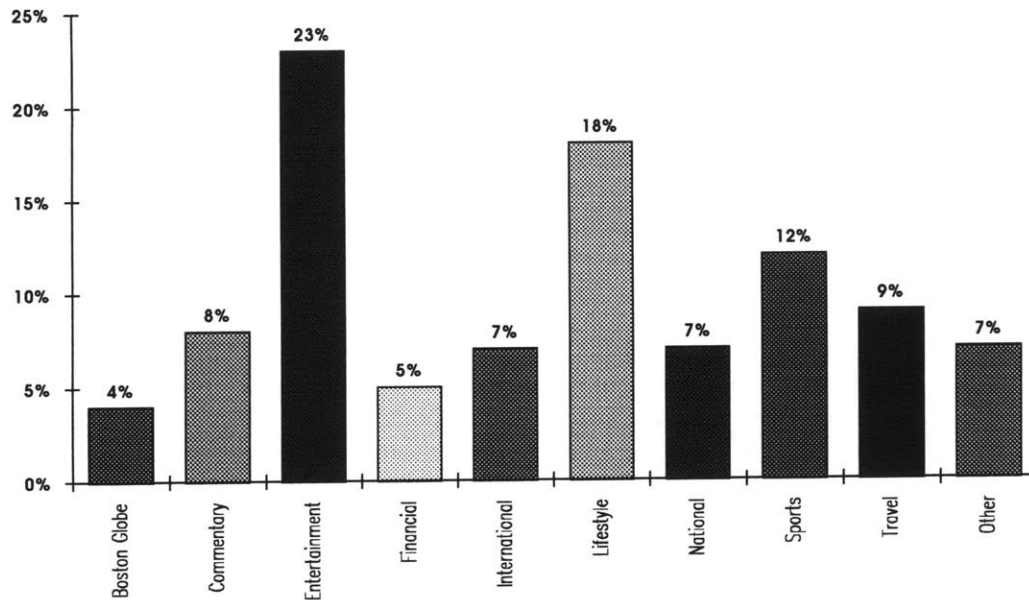
Figure 9:   Newspaper Project — External Article Usage[5]

All of the external articles in the NewsMaker server came from the Knight-Ridder and the Reuters news feeds. Scripts at the MIT Media Laboratory collected the news all day long and stored the articles for transmission. Except for cleaning up the format of the text (deleting common formatting notes to editors), no text processing of the articles was performed.

The external news group titles ("Commentary", "Entertainment", "Financial", etc.) came from the categories the wire services tag each article with. For this project this was an accurate way of grouping the news. The students were

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4.   The students access both the internal and external articles the same way.

5.   In most of the charts an "Other" group is recorded. These contained groups which the students did not commonly read. In this case the "Other" group consisted of articles tagged as Features, Politics and the Weather.

only able to read the articles in these groups. Towards the end of the project, *The Boston Globe* started to transmit articles to the school which editors thought would be of interest to the students.[6] These articles were chosen since they either related to work the classes were doing or seemed to be of interest to children in that age bracket. For instance an article about an upcoming solar eclipse fit these criteria. In time these decisions would be based on more feedback between the students and the editors at the Globe.

The names for the internal news groups came about for two reasons: custom news groups specific to the school; student groups matching the external ones. The custom news groups ("Classroom News", "Game Design", "Headlight News", etc.) were news groups relating to issues the students at the school might be interested in. Initially the students only had the external news groups and the custom news groups for their use. After several weeks it became clear that this was not adequate since students wanted to write articles about Entertainment, for instance, but were unable to.[7] For instance the students could find articles about entertainment in the group named "Entertainment — External," but could only create their own entertainment articles in the group "Entertainment."

The students created all of the internal articles found in NewsMaker. To create an article all a student had to do was select "Create" from the NewsMaker menus and type in a headline and a body. Once the article is saved it is made instantly available to all of the other users currently in NewsMaker.

Since this classroom was primarily working on their own articles for the newspaper project, it is not surprising to see the project's group having the most usage. Picking up the most interest after that were the "Rap Music" and

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6.   Since *The Boston Globe* news group was not active during the entire length of the project, the results are lower than they might have otherwise been.

7.   The reason students were not able to create their own articles in the groups reserved for external articles was due to the way NewsMaker expires old articles. It was found that keeping articles around for two to three days was adequate (since the news became too dated after that). However, students only had access to the computers once or twice a week and if they created an article it would likely be gone by the next session. To accommodate this, separate groups were set up for the students to use which were never expired out.

the "Video Games," two groups which were set up in response to the desires of the students.
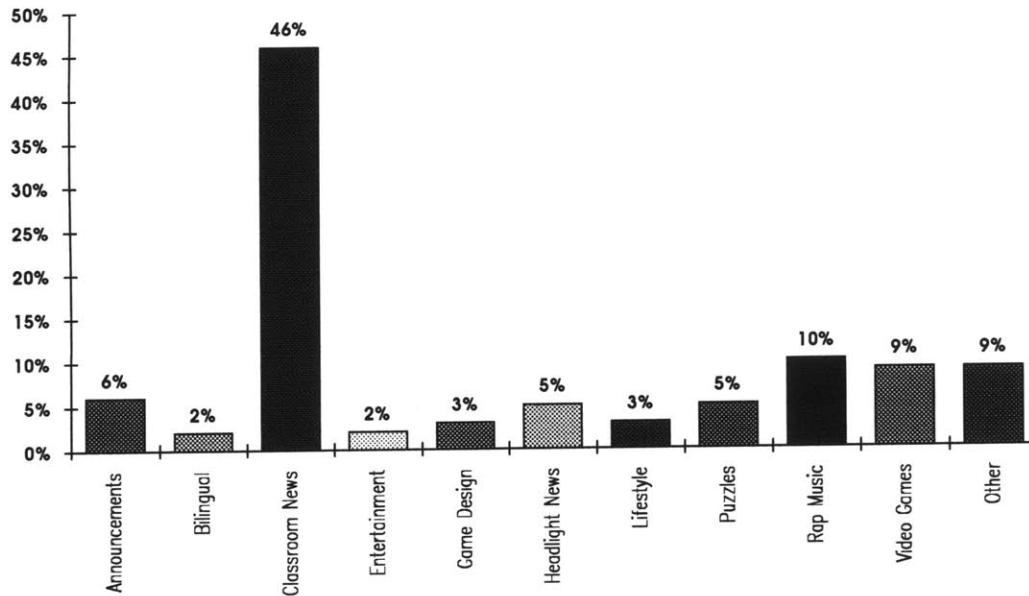
Figure 10: Newspaper Project — Internal Article Usage[8]

3.3   Game Design Project

As part of a science project students in a fifth grade advanced work class (ten boys and ten girls) were told to design computer games for a third grader to use. The only restriction made to the students was that the game had to relate, in some fashion, to the ocean (which the students were learning about in their other classes as well). For a period of several months the students worked on their computer games, learning how to design good games and becoming experts at the Logo programming language.[9]

As part of this process, a fellow MIT graduate student, Michele Evard, saw that NewsMaker could play a role in helping the students communicate to each other. Instead of telling the students to use NewsMaker for creating newspapers, Michele worked directly with these students using NewsMaker as a place to exchange questions and comments. The students used News-Maker to ask questions about their games and the problems they were having.

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8.   The "Other" news group consisted of Commentary, Features, Financial, International, National, Sports and Travel.

9.   For a detailed description of the ideas behind the game design concept see Kafai, 1993.

In addition to the students in the game design project, another fifth-grade class which had finished a similar project the previous term was given access to NewsMaker.[10] This additional class (eight boys, ten girls) went through the questions and answered those that they could. Considering that the students in the two classes do not see each other during the day except at lunch, this turned out to be an added resource.

3.3.1 Examples

Instead of writing long news articles to be printed out, the questions posted in the "Game Design" news group tended to be rather short messages which could be written and read quickly. The students were never told how to write their messages; they had to determine on their own the best way to ask questions in a written format which others could respond to.

For instance the following was a question which one user posted (the questions were primarily about the programming language Logo):

```
Subject: Colorunder

How do you erase the screen without it
happening with colorunder?
```

Another student saw this request and responded to it (the start of the subject was appended with a 'RE' to signify a response and the text of the original message was indented with a '>' character to make finding the original question and its responses rather fast):

```
Subject: RE: Colorunder

> How do you erase the screen without it
> happening with colorunder?

Try rg or cg and ct.

-- John
```

Another question read:

```
Subject: A MOVING SUBMARINE

I WANT A SUBMARINE TO MOVE,
GOT ANY IDEAS??????????
```

---

10. All of the projects were going on simultaneously and were all using the same server information. Students in a particular project had access to the articles written by students in the other projects. The students did not abuse the news groups and posted articles to the appropriate groups.

Received the following response (this time from one of the teachers[11] instead of from another student):

```
Subject: RE: A MOVING SUBMARINE

> I WANT A SUBMARINE TO MOVE,
> GOT ANY IDEAS??????????

You could use two or three shapes to make a large
submarine.  If you want the sub to dive then make
two or three shapes at an angle. Tell [1 2 3] SETH
90 PU REPEAT 5 [FD 5 WAIT 3]


Mrs. Smith
```

The largest use of NewsMaker was with this one group (see the usage section below for clarification) since the students not only posted questions and answers, but they tried to find answers to problems they were having even weeks after the original question was posted.

3.3.2   User Feedback

NewsMaker was introduced to this class right when they were starting to design their games. The students all had prior knowledge of the Logo programming language, but none had spent large amounts of time working on a single program and all of the problems that arise. Most of the activity in NewsMaker came during the first couple of weeks when the students were all working though their difficulties with learning Logo.

Two girls, Debbie and Laura both found NewsMaker to be of great help when they were starting their games since neither one knew Logo that well. After a few weeks, the questions they had became more detailed and were not easily answered with NewsMaker.[12] Debbie complained that some people did not know how to ask questions which could be answered, but observed that the questions and the answers all got better over time. One problem that Debbie had was with students who did not take NewsMaker seriously since that made it more difficult for her to find the answers to questions. In response to a string of what she felt to be useless responses from one fellow student, Debbie posted:

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11. A small number of questions went unanswered by the students. These were answered by either the teachers or one of the MIT researchers working on the project.

12. A number of students echoed this same feeling. Given that the initial questions were broad based and their later questions were very detailed questions that could only be answered within the context of the particular code segment this is not a surprising discovery. As a result of this, the usage level of NewsMaker dropped after the first couple of weeks.

```
Subject: John

John what you wrote to me I didn't like at all you
have at least ten files that say "jhtdfg".

I don't think that you get what NewsMaker is. Stop
writing "jfkdmsfacn" on NewsMaker.

-Debbie
```

Laura stated that she did not use the other news groups that much since she did not need the information in them like she needed the information in the game design group. Debbie liked the other news groups but due to the time required to write the games, she did not have time to spend looking at the other news groups.

One of the most active users of NewsMaker was one boy, William. William said that he watches his father use the bulletin board on CompuServe "all of the time while waiting for the computer." Even though he watches his father use CompuServe, he does not get to participate with it. Having NewsMaker allowed him to have access to his own bulletin boards which he could own.

William repeated the general feeling that there were too many messages posted which were useless, but did notice that the number of them had fallen during the preceding weeks. He was unsure if his fellow classmates had simply realized that there was a problem and had taken steps to clarify questions and answers, or if this was related to the drop in NewsMaker usage which the class showed toward the end of this thesis.

When asked about NewsMaker use in general (not just for the game design project), he stated that for NewsMaker to work it needed as many people as possible using it in order to make the news groups more interesting. He also wanted the ability to have many more news groups available for posting (a number of the groups were created as a result of student requests). He based this observation on the articles he looked at during his own free time (during this time he did not have to concentrate on the game project).

3.3.3   **Usage Levels**

While the students in the Game Design Project were not told to read the news, they did take advantage of the fact that the news was accessible to them:
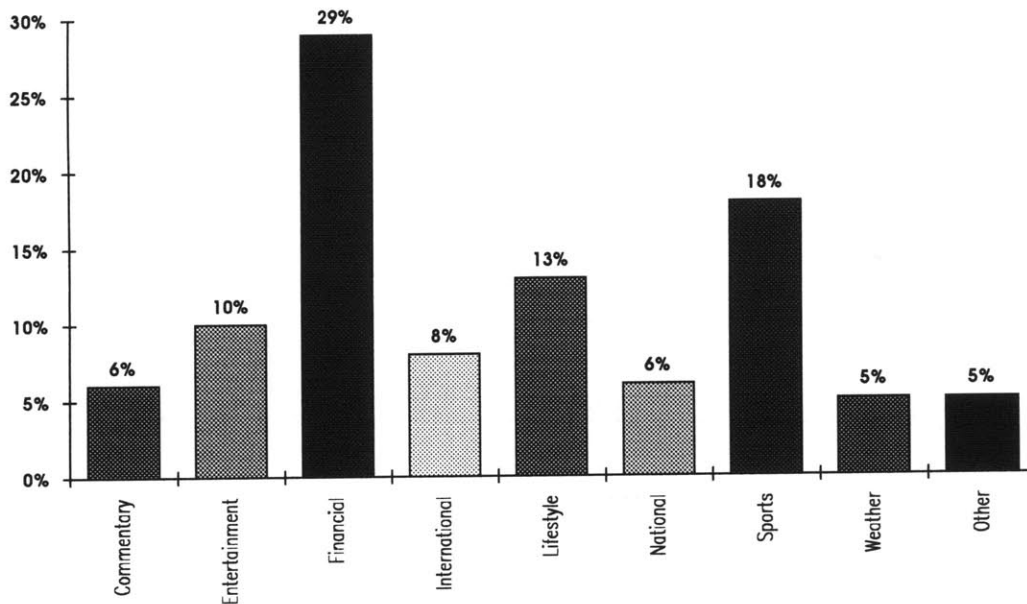
Figure 11: Game Design Project — External Articles[13]

Interestingly, the tracking files indicated that this group of students read the financial information the most, even though they were never specifically told to look for any financial information. When these results were shown to William he did not think that was a correct figure. He thought about the problem for a few seconds and hypothesized why this might have occurred. He realized that he and his classmates used the forward article function in the News-Maker interface which simply brings up the next article. When the last article in the group is read, the next article becomes the first in the next news group. In this case, the "Game Design" group was followed by the "Financial" group. So every time a student went through the lists he or she hit one article

13. The "Other" news group consisted of articles from *The Boston Globe*, Features, Politics and Travel.

in the financial group, which would explain the high percentage of hits in the "Financial" group.[14]
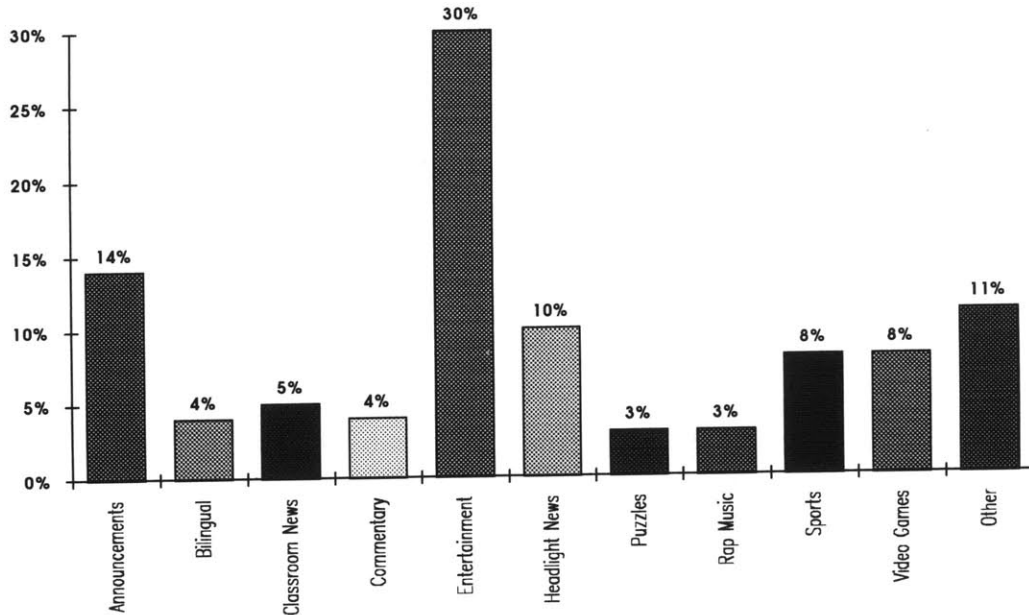
Figure 12: Game Design Project — Internal Articles[15]

It must be noted that the "Game Design" group is not reflected on this chart. This is a result of the "Game Design" group being read almost five times as much as the rest of the internal groups combined (1899 to 386), and including the "Game Design" group in the statistics would have seriously affected the results. The huge discrepancy between the "Game Design" group and the rest of the groups can be attributed to the function NewsMaker played in the classroom.

Even though the class participating in the newspaper project had its own group, the amount of time it took to write and read those articles was considerably longer than the quick questions being posted and read for the game design project. This would explain why the students in the game design project looked at a greater number of articles.

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14. This inconsistency is not found in the results from the newspaper class, but is part of the overall usage levels in the next section.

15. The "Other" news group consisted of articles from Features, Financial, International, Japan, National and Travel.

Internal article usage was about two and a half times greater than that of external articles (386 to 155). This is roughly the same results as the newspaper project (again, the "Game Design" group was not factored in).

3.4   Additional Projects

Once NewsMaker had been introduced to both the newspaper and game design projects, several other teachers expressed an interest in trying out NewsMaker in their classrooms as well. The newspaper and game design projects were supervised by graduate student researchers from the MIT Media Laboratory. Due to time restraints, plus a desire to witness the results from a much more hands-off vantage point, these classes were introduced to News-Maker and then left alone (except for answering questions as needed).

3.4.1   Japan Project

One class was introduced to NewsMaker in an attempt to get them more interested in a project the class was starting on Japan. This fourth-grade class consisted of nine boys and ten girls. The students were allowed to use NewsMaker if they wanted to during their normal computer time. NewsMaker was not used as a primary tool in this classroom. As a result, the students did not get that much usage out of the system.[16]

3.4.2   Bilingual Classes

Two bilingual classes were introduced to the NewsMaker system as well. One class consisted of nine boys and thirteen girls, the other twelve boys and twelve girls. A dedicated news group, "Bilingual", was set up for the two classes to use and the students were told that they could write about anything they wanted to in either English or Spanish.[17] The students in the two classes spent time writing poems in Spanish and English as well as writing about recent events. Some students even went as far as translating some of the articles into English as needed.

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16. This thesis was concluded two months before the end of the student's school year. Since the results of those two months cannot be anticipated at this time, it is unknown what type of usage levels the class will show as their studies progress.

17. Since none of the MIT researchers spoke Spanish there was a problem communicating some of the instructions regarding NewsMaker. These students were taught about NewsMaker from their teachers, fellow students and from observation. The NewsMaker interface is entirely written in English, however it could be easily modified to provide a set of Spanish menus. A larger problem would have been the searching of articles with Spanish words in them, as the language parsing routines NewsMaker uses are based on English.

The students who did not speak English were also at a slight disadvantage since there was no supply of outside articles in Spanish that the students could use. Clearly Spanish language support and Spanish articles would have to be added for schools where a large proportion of the students speak Spanish.

Even though the two bilingual classes were given their own news group to work in, some of the Spanish students wrote articles in the other news groups if they felt it made sense to them. For instance, some Spanish articles about school issues appear in the news group "Headlight News", even though the majority of the articles in the group were all in English.

3.4.3   Usage Levels

The results for all six classes were tabulated together to show what a cross-section of fourth and fifth graders might be interested in:
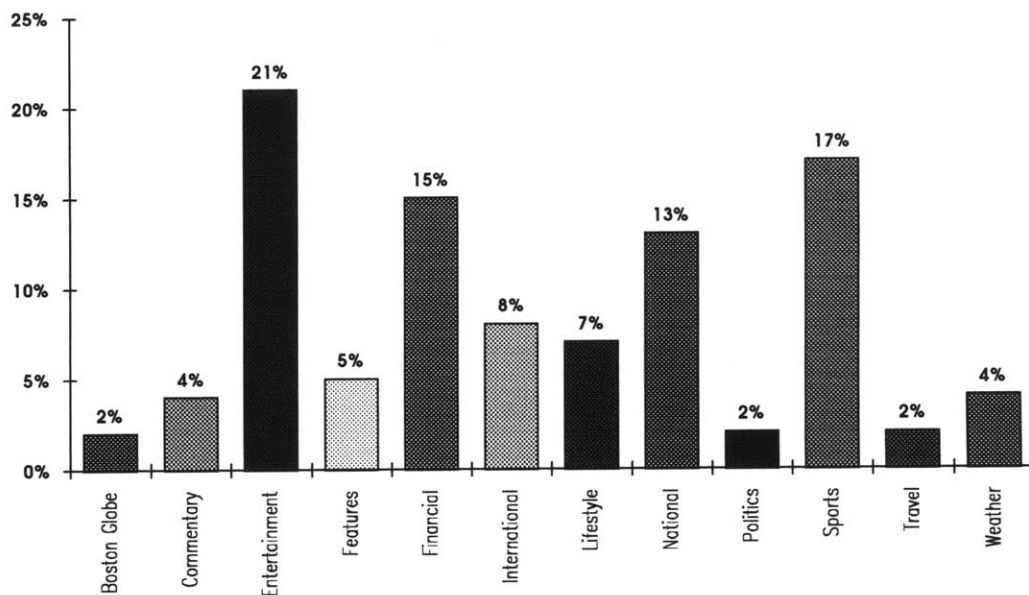
Figure 13: Overall Usage — External Articles

The results showed that the students were more interested in the articles which they or their fellow students wrote. Once again, the "Game Design" news group was not factored into these figures since that one group was read more than all of the rest of the internal groups combined (2894 to 2576).

During the duration of this thesis the students read the internal articles roughly three times more than the articles from the outside (2576 to 854). A portion of this difference can be attributed to the Spanish-speaking students only being able to read articles written by other students.

Of those articles read from the outside, the students were most interested in articles about Entertainment, followed up by Sports and National news. The

high percentage of interest in Financial could be attributed to the way in which the students read the "Game Design" news group.
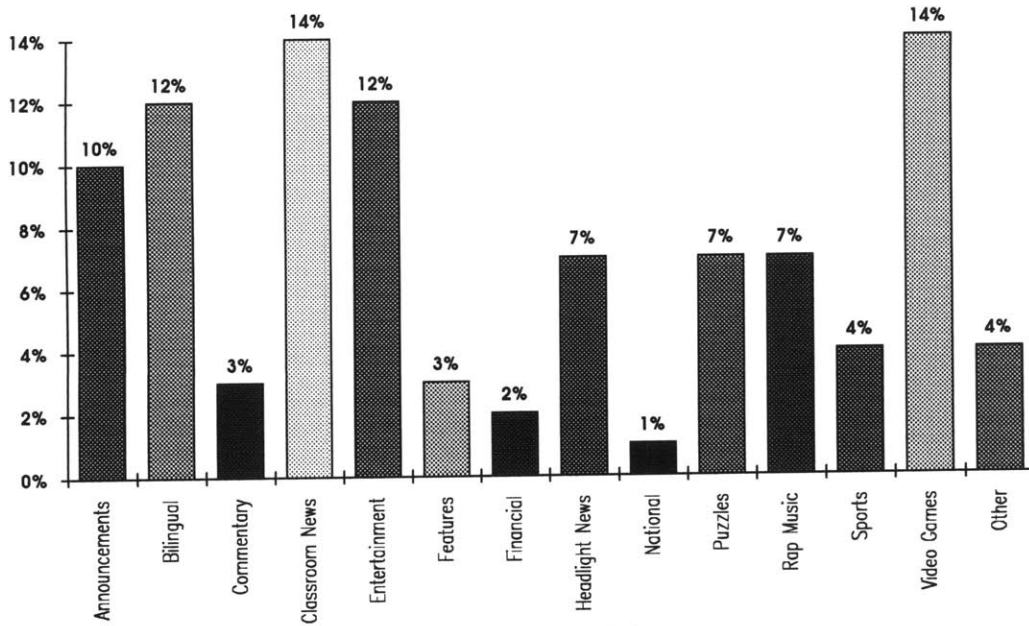
Figure 14: Overall Usage — Internal Articles[18]

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18. The "Other" news group consists of articles from Book Reviews, International, Japan, Travel, and Lifestyle.

Chapter 4

Conclusion

NewsMaker was used by several classrooms on different types of projects. Part of any analysis of the functionality of NewsMaker must be made not only on the software design, but also on the educational implications of such a system.

4.1   Software Design

Overall the software design of NewsMaker was successful. In fact, the amount of time the students spent using NewsMaker went beyond any initial hopes.

4.1.1   Unexpected Problems

The first several weeks of use saw several problems that had been unexpected:

- Network Problems — The computer network which NewsMaker was operating on top of, Novell version 2.2, had limitations which hampered initial usage. The first was a limit on the number of files a given file server could open at the same time, and the second was a limit on the number of files a file server could have on its hard drive (nothing to do with available space on the disk).

  These networking problems were solved by spreading the network load across multiple file servers, and dedicating one file server wholly for NewsMaker. The distribution of the network load solved the limitation on the number of open files, while the addition of a dedicated file server for NewsMaker solved the file limit problem. The problems might not appear on networks running different network operating systems.

- Printing Dilemma — The students were unable to print out any of their articles to the laser printers, because the Windows printer driver we had been using did not work for our purposes. The fix for these problems was to obtain a corrected printer driver from the manufacturer as well as to clean up the NewsMaker software to be much smarter in the way it printed out the final text.

By the time the printers were working the students had been using NewsMaker for five weeks. It is possible that some students were unsatisfied by this time since they were not able to create something they could physically own. Given a choice, I would have had the students using the printers as soon as they had written articles.

These problems had been largely beyond our control and were unexpected. In addition to these "surprises", a few implementation issues came up with regard to the user interface, which relates to the Microsoft Windows system:

- Mouse — As the students normally use the computers via the keyboard, the use of the mouse took up a major portion of the students time at first. Especially difficult to master was the "double click" concept which Windows uses as a selection device. This issue disappeared after the students used NewsMaker for several weeks.

- Moving Windows — Under Microsoft Windows users are able to move, resize and minimize windows. The students managed to lose the NewsMaker window rather frequently during the first couple of weeks. The solution which was devised by-passed the user's ability to manipulate the location and size of the window.

  Another Microsoft Windows standard is the "system menu" which is found in the upper left hand corner of the application window. Because the use of the mouse was awkward to the students, they tended to hit the system menu when they were attempting to reach the file menu (for details on the user interface, see the appendix "User Functions" on page 73). To avoid these problems the system menu was removed from NewsMaker.

With the exception of the printer problem none of these issues adversely affected the students.

4.1.2   **NewsMaker Tools**

During the time the students used NewsMaker they all learned about some of the tools designed into NewsMaker:

- Create — None of the students had a problem figuring out how to create a new article from scratch, nor did they seem to have a problem finding an appropriate group to put articles into. Soon after NewsMaker was introduced, the students requested new groups for particular interests they had (good examples of these are the "Rap Music" and "Video Games" news groups). Since the students were all able to create articles and did so in quantity over the duration of this thesis, the creation aspect was one of the strongest in NewsMaker.

- Reply — Originally the only way students could reply to a question that appeared in one of the groups was to create a new article from scratch. The reply function was added once we saw that the students were having

problems answering questions they could no longer see due to the interface. For some projects, like the newspaper project, this was a function that was really not used, but for others like the game design project this function was used extensively.

- Edit — The editing functions were used by some of the students[1] on what seemed to be a small subset of the articles. A reason for this could be that the articles the students wrote were all completed in a single session, and the students simply did not go back to work on their old articles except to print them out.

  This might have been different if the students had been given long term assignments to write their article on, but that would have gone against the initial introduction of the system which allowed the students to read and write anything of their choosing.

- Edit History — While the teachers all liked the knowledge that all versions of an article were saved, it did not seem that the students were interested in the edit history function at all. Almost certainly, this is related to the low usage of the editing function. If the students found themselves using the editing functions more, they might need the history lists.

- Searching — The searching tool excited some of the students when they were first shown NewsMaker. Except for finding articles about a particular figure in the sports sections, for instance, the searching functions took a back seat to the create function. Even though all of the students were given an overview of NewsMaker at the start, some of the students never realized this functionality existed. Only at the end when I asked them about it did I realize this fact.

  In retrospect, I would have stressed this function more to the students as this might have allowed them to find more articles of interest in the news groups (especially the external ones). I would have done this several sessions into the project instead of at the start since the students did not have any idea of what we were talking about during the first session. A quick "assignment" could have been given to the students which required them to use this function just to make sure that all of the students knew it was there.

  One minor implementation change could have also been made to make the searches a bit easier. Instead of only having a place for the students to type in a single word for searching, a list of the known searching words

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1. The students were only able to read articles from the outside when they were in the external news groups (although they could copy articles to an internal news group in which they could edit). They were able to edit articles which they created in certain groups like "Classroom News", "Headlight News," "Bilingual." The groups set up for posting questions/answers, like the "Game Design" group, did not allow for editing once a question had been posted.

could have been provided.

4.2   Classroom Tool

NewsMaker was used in several different fashions, all of which gave the students a slightly different view of communication:

- Newspaper — The students in the newspaper class learned about what it takes to communicate with others via the printed word. The next step in this project might be to have the students create newspapers based on current events, with articles taken from the outside to help support opinion articles that the students might write.

- Local Discussion — The students in the game design project were quickly able to use NewsMaker to answer short questions on broad based problems. Several of the students all began to see that forming well written questions which could be answered with the given facts was just as important as getting the correct answer to a question.

- Bilingual — While NewsMaker is primarily designed as a tool for communicating in English, the students in the school who did not speak English were able to take advantage of the system by communicating to each other in Spanish. Those students who spoke both languages were able to help their fellow students while increasing their writing and reading in both languages.

There is one major question which arises surrounding the use of NewsMaker which is: "Given the scope of NewsMaker, how did the students change the way in which they communicated with each other, and how did their ownership of the articles change?" Unfortunately only at the end did we start to see students who were proud of the articles they had written and the newspapers they had printed out. Clearly some of the students saw the projects only as a classroom assignment, but students like Paula created newspapers for others to read. Understanding the concept of ownership of articles by the students might lead to a firmer handle on the types of news the students themselves are interested in. Given the scope of this thesis these issues could not be studied, but given the scope of NewsMaker in the long term, these issues might be more understandable.

However, as this thesis was being concluded simply having NewsMaker in the classroom was having some impact in the way teachers were starting to think about future assignments. One teacher added a page to the school's yearbook which contained a newspaper with several articles related to the upcoming graduation. Another teacher had just added a "Book Review" group which she intends to use to get the students writing about books they have read and are going to read. She already has two projects related to books in mind for the future.

Other teachers were just starting to notice that they now had a resource at hand which provided a great deal of information to them that they did not have before. At this time it is unclear if that interest will lead to new types of projects not thought about here.

4.3   Future Tools

The decisions which served as ground work to the implementation of News-Maker were based on the computers available at Project Headlight as well as time restraints. Certainly, the conclusion of this thesis does not prevent others from advancing NewsMaker for different needs.

4.3.1   Electronic Output

Currently, NewsMaker uses the computer display to show the students a single text or graphic article and the final output is paper only. Creating an output format which can be displayed on the computer monitors makes a good deal of sense for a couple of reasons. First, the printed copy cannot be seen by everyone on the network unless the student makes multiple copies for everyone. Second, an electronic output would allow the addition of data types, i.e., television and audio news. Third, electronic output would facilitate the movement of the newspapers beyond the local school if NewsMaker were ever setup at multiple sites.

4.3.2   NewsMaker/Logo

As the computers are used frequently for logo programming at Headlight, it would make sense to have NewsMaker be part of a logo programming system. In his wish list, the fifth grader in the game design project, William, said that he wanted NewsMaker and Logo to live on the same computer. He wanted this so that going back and forth from NewsMaker to the programming system would be easier.[2] This would allow students to have access to the news whenever they are using the computers and to use the news as part of their logo programs and even as part of the games they build.

Down the road the students would become familiar with news and could conceivably use the programming capabilities of "NewsMaker/Logo" to build newspapers automatically to fit their own desires. This sort of interaction might not happen at the elementary school level but could happen with high school students.[3]

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2. The students had a separate boot disk which they used to start NewsMaker. Some of the time the students were able to use two computers which helped to some degree.

3. This goal might not be that difficult to obtain due to the way Microsoft Windows works. It would be possible to find a version of Logo for Windows, and simply have NewsMaker installed also. Some programming would have to be performed to have the two applications talk to each other, but since this type of inter-application communication is built into Windows it would not require major development time.

4.4   Final Note

The students and teachers all found NewsMaker to be an exciting new addi-
tion to the computer time they were already using. Clearly, the use that News-
Maker received was due in large part to the teachers who made it an integral
part of the classroom. On its own, NewsMaker did not seem to capture the
long term interests of most of the students, but once given simple guidelines
and a formal framework in which to work, the students excelled at creating
news they were interested in.

Due to the way NewsMaker was implemented it went far beyond the scope of
any of the software the students had used before. If the students had been
given the task of creating a newspaper in the past, they would have done so
using a word processor which was only designed for one user reading a single
article. Instead, NewsMaker allowed many students to have access to a large
number of articles simultaneously. One student could write an article, and
another could print it out or respond to it, even if the author had not told the
other students about it.

Even though the students used the internal articles a great deal more than the
external ones, the students were exposed to news as they would not have been
before. Over time, one would hope that the students would be able to make
more use out of the external articles as they become more interested in their
own world. It is unclear if the students were simply too engaged with their
own articles, or if formal classroom assignments might be needed to encour-
age the students.

Just putting computational tools into a classroom environment does not guar-
antee success. It is up to the schools to provide teachers who can help the stu-
dents to realize their own potential through training and helpful support.
Without this, the computers and software only serve as large paper weights.

Appendix A

Server Structure

NewsMaker is a software system consisting of several custom applications. This chapter gives the required directories and files. As each site is different, no program exists which will create any of this automatically.

A.1 System Requirements

NewsMaker can be implemented for use on any computer system. At the present time NewsMaker is only written for Microsoft Windows.

Presently, NewsMaker requires the following:

- Any IBM PC compatible machine running DOS 3.3 or later with Microsoft Windows Version 3.1 running in either Standard or 386 Enhanced Mode.

- A hard disk drive with at least 40 Megabytes of free space. It is assumed that most users will be using some networking system so that multiple users can access the server at the same time. However, NewsMaker will work on a stand-alone machine.

- Phone line and a modem, or other method for data transfer between the central site and the client site. Presently NewsMaker uses a public domain copy program to transfer data between the two locations.

The **central site** is where NewsMaker is managed from. The central site actually receives the news data in real time from the news suppliers, and stores the data for transmission to the **client site**.

In the case of this thesis, the central site is the Media Laboratory at the Massachusetts Institute of Technology, and the client site is the Hennigan Elementary School in Boston, Massachusetts. The only connection between the two sites is a single phone line.

A.2   Article Transmission

The central site is responsible for receiving the incoming data from the news suppliers in real time, storing up a portion of the articles and transmitting them to the client sites. For NewsMaker all daily information is contained in one single file created in the following order:

- For each desired news group in the news server create a file containing appropriate articles. Each news group is given its own file to make parsing the file fast, as well as to limit the extent of any damage that the transmission method might cause. The content of each file is a single Dtype, a data type created for use at the MIT Media Laboratory [Abr92].

- Obtain any other files which might be needed at the client site. Examples might be mail to the users, image files or even new versions of the executable files.

- Now that there are a collection of files in a single directory, create a single file from all of them. For this purpose the UNIX archive utility **tar** is utilized.

- For the sake of bandwidth a common file compression scheme is used to makes the file somewhat smaller. For this purpose, use the GNU compression utility **gzip**.

- With this single file, use the UNIX uuencoding scheme to create a file which can be transmitted via electronic mail. This is required since the compressed file contains binary data which cannot be processed through standard electronic mail. The uuencoding scheme takes binary data and through a mapping routine creates a text file which can then be mailed.

- Mail this file to the destination.

The client site will then obtain one piece of electronic mail each morning containing all of the necessary data. The reverse process is applied to retrieve the data:

- Receive uuencoded electronic mail.

- Decode this file using the uudecode routines.

- Decompress the compressed file.

- A single archive file now exists, extract all of the files from the archive.

- Using custom NewsMaker utilities, extract all of the information from the new files.

A.3   Executable Files

NewsMaker files can be found in a single directory referenced by the environment variable, "NIF_SERVER". This should be a directory available to every machine which needs access to NewsMaker, and any network software must

allow this directory to be both readable and writable. To set this environment variable on a DOS machine, put the following line into your autoexec.bat file:

        set NIF_SERVER=i:\server

This assumes that the machine will be accessing the NewsMaker data from the directory "i:\server".

For the duration of this section the assumption is made that a "server" directory exists on a network drive "i:". However, there is no reason this directory must be either on the "i:" drive or named "server". NewsMaker simply requires a directory location to start work from.

Once a directory exists, the first step towards making NewsMaker operational is to put the required executable programs into the server directory. There are three groups of executable files. The first are the windows-related files:

- **viewer.exe** — NewsMaker program for Microsoft Windows.

- **viewer.hlp** — Windows help module.

The second group of executable files are NewsMaker-specific DOS programs which exist for the purpose of server maintenance. These programs are used each evening when none of the users are logged into NewsMaker:

- **get.bat** — Script file which calls all of the required programs in the correct order

- **getmail.bat** — Script file which sends mail back to the central site. NewsMaker sends user mail, tracking information and server status files to the central site each evening.

- **art_util.exe** — Server maintenance program. Performs article extraction, article expiration, sorting routines and other required functions.

- **timer.exe** — Aids the scripts by delaying operation until a specified time.

The last group of files are standard public domain programs which work with the maintenance programs:

- **uudecode.com** — Decodes uuencoded electronic mail.

- **uuencode.com** — Encodes a binary file for electronic mail.

- **tar.exe** — Takes an archive file and extracts the files from it.

- **gunzip.exe** — Decompresses a file which was compressed using the GNU compression routine.

- **go32.exe** — 32-bit extender program for the GNU DJGPP C compiler. This is required to make the 32-bit programs (both gunzip.exe and art_util.exe) take advantage of the Intel 386 architecture.

A.4   Data Storage

NewsMaker data files are primarily text files containing ASCII tabs and new line characters which signify the end of data sections.

A.4.1   Server File

The main entry point for all of the NewsMaker data is a single file in the server directory, **server.mst**. Without this file, NewsMaker cannot operate. It is assumed that this file is not changed while users are using NewsMaker. If this file does change during an active session, NewsMaker will exit out to preserve data integrity.

Here is a sample server file:

```
dir1      exp1      sec1      sort1      Descrip1
dir2      exp2      sec2      sort2      Descrip2
...
dir10     exp10     sec10     sort10     Descrip10
```

The first entry is the directory name for each news group. Each news group in the server has its own unique directory for storage. Following this entry is a single tab character.

The second entry is a numeric value giving the number of days in which articles are saved before they are expired out. A zero is used for news groups which never get expired out. This entry is followed by a single tab character.

The third entry is a numeric value giving the security level for this news group. As system administrators might want to control access to the data, this is done on a group-by-group basis. Present values for this setting are:

- 0 — This news group is designated read only.

- 1 — Articles can be created in this news group, but no editing is allowed.

- 2 — Articles can be both created and edited in this news group.

In addition to group level security there exists security on a user basis, (see the "Users" section later in this chapter). The security level entry is followed by a single tab character.

The fourth entry is a numeric value giving the sorting parameter for the news group. Presently a "0" signifies that the news group is to be sorted alphabetically on the headlines, and a "1" signifies that the news group is to be sorted by date, the most recent articles showing up at the top of the listing. This entry is followed by a single tab.

The final entry on the line is a text description for this news group. This is the name which will actually appear in the menus that the user sees. This is used since the DOS directory structure does not allow names to be longer than

eight characters with a three-character extension. This entry is followed by a new line character. No new line characters are permitted in any of the entries, as the new line character signifies the end of an entry.

The server routines will go through this file and for each line pull out each group. The number of news groups in the NewsMaker system can be simply obtained by counting the number of new line characters in this file.

A.4.2   **News Group Files**

Each news group in the server is given its own directory. Inside each of these directories is a single file, **source.mst**, which supplies the news group information. This file is parsed each time a user makes a request.

Here is a sample news group file:

```
file1    author1    date1       headline1
file2    author2    date2       headline2
...
file99   author99   date99      headline99
```

The first entry is the file name for the current article. Each file name is unique, in order to assure that the file name is a time stamp giving the number of seconds since 00:00:00 GMT January 1st, 1970. It is unlikely that two users might attempt to create two different articles in the same news group at precisely the same time, thus having one file overwrite the others. This entry is followed by a single tab character.

The second entry is the name of the author. This entry is followed by a single tab character.

The third entry is the date of the article. In order to assure some level of similarity NewsMaker formats all of the dates to be: *Month, Day Year.* This is the entry used to calculate if an article should be expired out each morning. This entry is followed by a single tab character.

The final entry on the line is the headline for the article. The headline may contain any number of characters. This entry is followed by a new line character. No new line characters are permitted in any of the entries for the news groups, as the new line character signifies the end of an entry.

Each article in the news group has its own line in the group file. The server routines will parse the news group file each time the user requests a news group listing.

A.4.3   **Articles**

To get to this point, NewsMaker has to have a directory location to the news group and a file name. The data for each article is stored in separate files in the news group directory. If one wanted to have an article appear in different

news groups, the article would actually have to be posted and stored multiple times.

NewsMaker has two types of articles:

- Text articles: The file names all end with the extension '**.txt**'.

- Graphic articles: NewsMaker imports only Microsoft Windows Bitmap files which all have the file extension '**.bmp**'. Along with this file a secondary caption file exists with the file extension '**.cap**', which contains the author, date and caption information for the graphic image. This is needed since the bitmap file format does not provide for auxiliary text data in the file.

When a user requests an article, NewsMaker looks at the file name in the group file and determines the article type. NewsMaker then reads the article into memory and properly displays it for the user.

The file format for the text and the caption files is:

```
author
date
headline
keywords

^L
Body of text
```

The first line of the file is the author of the article followed by a new line character.

The second line of the file is the date the article was written followed by a new line character.

The third line of the file is the headline of the article followed by a new line character.

The fourth line of the file contains keywords found in the article to aid users searching for articles on a particular topic. Each keyword is separated by a single space with a new line completing all of the keywords.

The header information is followed by a new line and a new page character which tells the parsing routines that the rest of the file is the body.

The first several lines of the file contain duplicate information found in the news group file. The data is stored in both places to aid in reconstructing the data should any of the files become corrupted.

Further article types could be added as required.

A.4.4   **Searching**

Each article may have searching information imbedded inside of it to aid users searching for information on a particular topic. For instance, a user might be interested in articles pertaining to the President of the United States. The user would simply ask NewsMaker to find articles with the word "Clinton" in them. NewsMaker would then go through each article and see if it finds the word "Clinton".

NewsMaker tags each article in the server each evening with a list of twenty keywords generated from the text of the article and stores them with the body of the text. The routines which generate the keywords were developed for use at the MIT Media Laboratory by Jon Orwant. The keywords are then matched against each other and placed into separate list files, one file for each letter of the alphabet. In the case above, the user has requested information on "Clinton". NewsMaker will then go through each news group and open up the file containing keywords which start with the letter 'c'. All of these can be found in a file appropriately named 'c.lst'.

The contents of a list file might look like:

```
alifornia        file1       file19
linton           file15      file20      file4
ountry           file1       file4       file5
```

The start of each line is the keyword followed by a list of file names. The keywords have the first letter stripped off because it is known that all entries in this file start with the letter 'c'. In the search for "Clinton", NewsMaker would then point the user at the files: "file15", "file20" and "file4", thus helping the user find particular information of interest.

These listing files are recreated each evening for all of the articles in each news group as old articles are deleted and new ones are added. Any new articles which users might add during the day will not be part of the searching scheme until the next morning.

A.4.5   **Editing Information**

Users are allowed to edit articles as needed. To aid users in seeing how articles have been edited by others, all changes are saved to disk.

The edit history files are all given separate files in the directories. In the case of text articles the ".txt" file is always the current article which NewsMaker will open when a user requests an article. If edits exist, the original article is saved with the same base name but with the file extension ".e00". Each edit level beyond the first is given the next available file name, ".e01", ".e02", etc.

When a user requests a revision, NewsMaker goes to the revision file and opens it for the user. The format of these files is identical to the original file.

A.4.6   **User Group Information**

In addition to the news information that NewsMaker maintains, information for each user group (i.e., a single classroom) and each user is kept as well. Similar to the news group directories, the different user groups have their own directories.

In the server directory there is a user group file, **teachers.mst** which gives all of the information for the different classes using NewsMaker:

```
dir1      print1      name1      headline1
dir2      print2      name2      headline2
...
dir5      print5      name5      headline5
```

The first entry is the directory where all of the information for that user group is located. Each directory name is unique. This entry is followed by a single tab character.

The second entry is a numeric value indicating the printing ability of the user group. This was put into place as not all of the teachers want their users to be able to print all of the time. A "1" entry allows users in this user group to print; a "0" prevents printing. This entry is followed by a single tab character.

The third entry is the name of the user group as it should appear in any menu or dialog boxes. In some cases, users will be prompted to log into News-Maker, and this is where they would see this entry. This entry is followed by a single tab character.

The last entry on this line is the default headline for this user group. Users can set up their own headline. If they do not, this is the headline they will use. This entry is followed by a single new line character.

A.4.7   **User Information**

In each of the user group directories is a user file, **users.mst**, which gives information for the different users using NewsMaker. The format of the user file is:

```
user1     sec1        login1      headline1
user2     sec2        login2      headline2
...
user20    sec20       login20     headline20
```

The first entry is the full user name of this user. This entry is followed by a single tab character.

The second entry is a numeric value giving the user's security level. As stated previously, NewsMaker has both a group level security and a user level secu-

rity system. This entry gives NewsMaker the user's security level whose value is one of the following:

* 0 — None: Users are allowed to read articles only.

* 1 — Partial: Users can create articles and edit their own articles if the group allows editing.

* 2 — Full: Users can create articles and edit all of the articles if the group allows editing.

* 3 — Super: Users can do anything. This by-passes the news group level security. This is meant for system administrators only.

The third entry is the user's network login name. NewsMaker does not use the network login names for tracking users as these names tend to be rather impersonal. In the case of the author, the network login name would be "markk", but under NewsMaker the full name is "Mark Kortekaas". One minor note on names: the assumption is made that the first eight characters of each user name is unique, excluding spaces.

If the environment variable "username" is set, NewsMaker will look at that value and see if it matches any of the login names contained in the user files. If the "username" value is not set or no matches can be made, then News-Maker will prompt the user to log in when the program is started. The login name is an optional one. However, a tab character must be used for placement.

The last entry on the line is the custom headline for this particular user, which is then followed by a new line character. The custom user headline is optional, if this space is left blank then NewsMaker will use the default headline for this class.

A few other files can be found for each user in the user group directories:

* Tracking Files. These files, which have the first eight characters of the user name followed by the extension '.trx', are the tracking files for each user. This stores which articles the users read and at what time. This is used to calculate which groups were utilized and to better generate future articles for transmission.

* Newspaper Files. These files, which have the first eight characters of the user name followed by the extension '.nws', store the newspapers for the users. These files are the only binary data files NewsMaker uses. They store the following information: The order of articles in the newspaper, the groups and file names of each article and any attached articles. Attached articles are supplementary files, like graphic images, which the layout routine places with the main article.

A.4.8   **Mail Files**

In an attempt to keep mail separate from the rest of the user group data, the mail files are stored in another directory off of the server directory. This directory is named **maildir**, and it contains the following subdirectories: **in**, **out** and **backup**.

Incoming mail to the users is stored, appropriately, in the "in" subdirectory. Each user name is taken and the first 11 characters of that name are used to create a file name. In the case of the author, the full name "Mark Kortekaas" would map to a file name "markkort.eka". In this file one would find mail addressed to the author from the system administrator.

Outgoing mail from the users to the system administrator can be found in the "out" subdirectory. Every piece of mail addressed to the system administrator is given a time stamp and stored separately. Each evening the transmission routine goes through and obtains all of the mail stored here and mails it to the central site.

Finally, the "backup" directory is used to store all of the mail that is transmitted daily to the central site. As information is gathered, it is deleted from the storage directories, but a large file is stored in this directory to ensure that if anything goes wrong with the transmission the system administrator can look at this directory and recreate any lost data.

A.4.9   **Directory Summary**

NewsMaker ends up with a directory structure which looks something like:

```
-SERVER  all executable files
         'server.mst'
         'teachers.mst'
         -TEACH1.DIR            'users.mst'
                                user tracking info
                                newspaper files
         -TEACH2.DIR            'users.mst'
                                user tracking info
                                newspaper files
         -GROUP1.DIR            'source.mst'
                                all articles
                                editing tracking
         -GROUPE2.DIR           'source.mst'
                                all articles
                                editing tracking
         -MAILDIR    -IN        incoming mail
                     -OUT       outgoing mail
                     -BACKUP    backup data files
         -UTILS
```

The descriptions for the directories and files are found above, with the exception of the "utils" directory. This is a directory created to store any supplemental utilities which might be needed for NewsMaker at a particular site. For instance, at the Hennigan School this directory contains all of the transmission routines which are needed.

A.5   Building Project

NewsMaker was written entirely in the "C" programming language during 1993 and 1994 at the MIT Media Laboratory. Since the code was written to be moved to different platforms as needed, different programming systems can be used. As an aide to others who might be interested in building and expanding upon the functionality of NewsMaker, following is a brief summary of the tools used to build the present version of NewsMaker.

The tools used built both 16-bit and 32-bit executable programs. Consult a book on IBM PC programming for more information on the differences between the two.

The base library which maintains all of the server functions, such as opening and parsing the server and group files, is written entirely to the ANSI C specification and is compiled using two compilers. The server functions and the interface functions were deliberately kept separate from the start, which makes writing new utility programs and interface levels easier.

The first compiler is the GNU DJGPP compiler (version 2.2.2 and 2.4.1). This is a readily available public domain compiler which builds 32-bit code modules. This was used to build the art_util.exe file as this file used both Nathan Abramson's Dtype library as well as Jon Orwant's Text Library. These routines utilize the large memory space of the 32-bit compilers.

The second compiler used is the Borland C++ (version 3.1) compiler. This is a standard commercial compiler which built the 16-bit server library as well as all of the Windows interface code. The Windows interface code was all written using the standard Microsoft Windows 3.0 Graphical Display Interface Specifications.

In addition to the Borland C++ 3.1 compiler, both the Borland C++ 4.0 compiler and the Microsoft Visual C++ 8.0 compiler were tested and used during some point in the development. The final choice of a development kit was not based on any technical issue as much as a personal one by the author.

Appendix B

User Functions

NewsMaker is a collection of custom software applications which, when combined, create an end-to-end news system. This chapter describes the final application, the reader, with which the users interact. It is assumed that readers know how to use the operating system already.

B.1   NewsMaker Reader

The Microsoft Windows implementation of NewsMaker has two main windows:
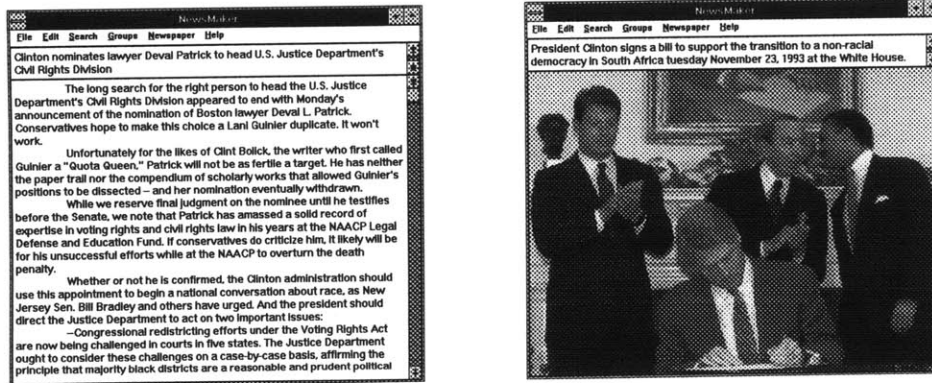
Figure 15: NewsMaker User Screens.

On the left is an example of a typical text article, while the right image shows a graphic illustration. To the user, all interaction with NewsMaker is done from one of these two screens, with a few extra dialog boxes added for specific purposes (which are all described in detail in the following sections). NewsMaker automatically selects the correct window for viewing (depending on the article which the user wishes to read in), and there is no distinction between user-made and external articles.

B.2   File

Perhaps the title "File" is misleading as NewsMaker users do not work with files directly. However, just as all Windows Programs have a "File" entry as the first entry in the menus, so too does NewsMaker.

B.2.1   New

Depending on security levels, users are able to add new articles into News-Maker. When the user selects this entry, a selection box will appear displaying all of the news groups the user is able to add articles to. Upon selecting a news group, a blank text screen will appear allowing the user to type in a new headline and a new body of text.

The ability of a user to create an article is based both on the news group level security and the user's security. If the user cannot create an article in any news group, this menu entry will be disabled.

B.2.2   Reply

Some of the news groups may not be external news groups, but a posting location for information and questions by members of a user group. The reply function is very similar to the "New" function, except that reply will copy and indent the current article. Users are then able to add comments with the original message right there.

The reply function automatically uses the current article as the base in the current news group. When the user saves the response, it gets posted to the same news group as the original. This entry is disabled if the user cannot create new articles in the current news group.

B.2.3   Forward Article

Due to the amount of information sent into the client sites each day from external suppliers, articles must be deleted from the server frequently to avoid problems. Users may find that they do not have enough time to work on articles before they are deleted out, so NewsMaker allows users to forward an article in one news group to another news group which will be saved for a longer duration.

To prevent loss of information, users are prevented from making changes to news groups with a short expiration time (a few days for instance). By using "Forward Article", they can copy the article they are currently reading to another news group which they can write into.

The entry is disabled if the user is currently reading an article in a news group they can create in, or if they are currently editing an article.

B.2.4   **Save**

The save function saves the present article which the user is working on. If the user had previously selected "New" or "Reply" then save will create a new article in the present news group. If the user had been editing an article, then the save function will save both the present version and the previous version, which allows for edit tracking.

B.2.5   **Print**

The print function will print out the present article to the printer. This is different from "Print Newspaper", which prints out a collection of articles into a single newspaper, (see the "Print Newspaper" section below). If the teacher does not want the class to print, this menu entry will be disabled.

B.2.6   **Exit**

Exit NewsMaker. If users are working on an article, they will be prompted to save their work before leaving.

B.3   Edit

NewsMaker has two modes, the first is "read only" mode which allows the user to read articles. The second mode is "edit mode" which allows the user to both read and to edit the content of an article. The "Edit Article" function described later in this section details the process of moving from read to edit mode. NewsMaker is in read mode whenever a new article is selected.

Most Windows Programs have a menu entry "Edit" in the second position, which determines the placement of this menu.

B.3.1   **Undo**

Undo the last change to a block of text in text sections. This function will be blocked out if the user is not editing an article.

B.3.2   **Cut/Copy/Paste/Delete**

NewsMaker allows users to cut and paste sections of text between different NewsMaker articles, and between NewsMaker and any other Windows application.

- Cut — will take a highlighted section of text and move it to the Windows clipboard. This text can then be "pasted" back using the paste function. The user must be in edit mode and must have a block of text highlighted in order for this to work.

- Copy — will take a highlighted section of text and copy it to the Windows clipboard. This text can then be "pasted" back using the paste function. This function will work if the user has a block of text highlighted.

- Paste — will take text in the Windows clipboard and will put it in the

current cursor location. The user must be in edit mode for this to work.

- Delete — is a duplicate of the delete key on the keyboard. If the user is in edit mode and has a block of text highlighted, the delete function will remove the section of text. Unlike "Cut", the paste function will not bring the text to other applications or other NewsMaker articles.

B.3.3   Select All

Users can highlight sections of text for use with the cut-and-paste functions, there are times when one needs to highlight all of the text in an article. Selecting this menu entry will highlight all of the text in the currently selected box.

B.3.4   Edit Article

A user enters edit mode by choosing "Edit Article". When the user is in edit mode, a check mark will appear next to this selection in the menu. Users leave edit mode when they select a new article. They must re-enter edit mode if they wish to edit the next article.

Users are free to edit articles and save them as much as they want to help avoid any loss of work if there is a network or computer failure. NewsMaker will prevent each individual save as counting as a new revision number. However, if the user makes a change, leaves NewsMaker and then re-enters News-Maker, any change on the same article will count as a new revision.

Only one user is allowed to edit an article at a time. NewsMaker puts a lock on articles preventing other users from editing the same file.

Users may only edit an article if the security level for both the user and the news group allows the current article to be edited. If for security reasons the user is not allowed to edit the current article, this menu entry will be disabled.

B.3.5   Edit History

If an article has been edited, users are able to see the history of the article through its life in NewsMaker. Users do not have to be able to edit the article

to view the history. When users select this entry they get the following dialog box:
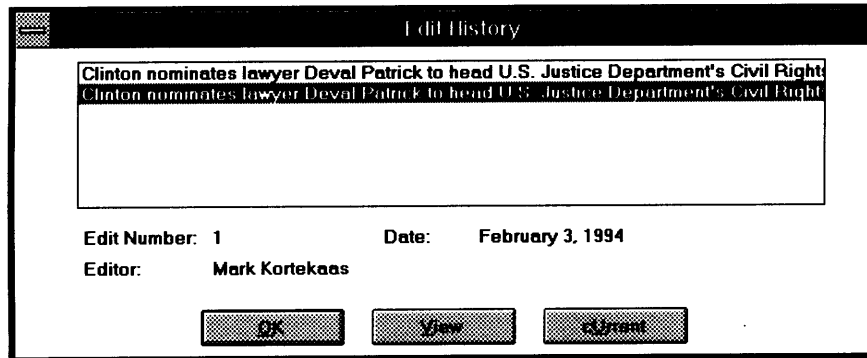

Figure 16: Edit History Dialog

- The list box contains a list of all of the headlines which the article has used. In addition, under the list box NewsMaker will display the revision number, the date of the edit and the editors name.

- Ok — Exits edit history.

- View — Compare the current revision with the selected revision.

- Current — If users are allowed to edit the article, they are also able to bring an old revision to the front. This will cause the current revision to be placed into the edit history and the older revision to be duplicated.

B.4   Search

NewsMaker has two types of search capabilities. One allows the user to find articles of interest from the news groups. The second allows users to find text within the current article, useful in edit mode.

B.4.1   Search Articles

Keyword searching is provided by NewsMaker giving users the ability to find articles in either the current news group or in the entire server. The keywords

are, hopefully, representative of the content found in any given article. The user is presented with the following dialog box:
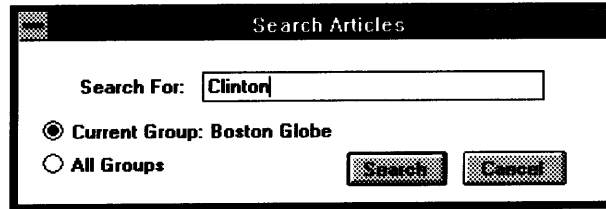

Figure 17: Search Dialog

The search for text section allows users to type in the keyword they are interested in. NewsMaker shows the current news group name, as well as allowing the user to select a wide search across all of the news groups, or to just search in the current news group.

Once a user chooses a search criteria, NewsMaker will search for that keyword and, if there are any matches, display the "Article Selection Box", described in the next sections. If there are no matches, NewsMaker will inform the user there were no matches.

B.4.2   **Find/Find Next/Replace**

The next three menu entries are all common to most Windows applications:

- Find — Searches for a given word in the current text.

- Find Next — Finds the next occurrence of a given word in the text.

- Replace — Will replace a given string with another one. This function will only work if the user is in edit mode.

B.5   **Groups**

The groups menu is the entry point to the articles. This menu is built each time the user enters NewsMaker, based on the news groups found in the server file.

B.5.1   **Next Article**

The "Next Article" function will bring up the next article in the current news group. For example, if a user is reading a article in the "Entertainment" section and selects this entry, NewsMaker will display the next article found in the entertainment news group. If the user is on the last article in a news group, the first article in the next news group will be read instead. The user can also access this function by pressing the 'F6' key on the keyboard.

A few other functions exist which are similar in function to "Next Article" but are hidden from the menus:

- Previous Article — Will bring up the previous article in the current news group. This is accessed by pressing the 'F5' key on the keyboard.

- Next Topic — Will read in the first article in the next news group. NewsMaker does store a pointer into the news group data which will keep track of articles viewed, and if the user has already read the first article in the next news group, the second article will be read in instead. This avoids having users confused as to what they are seeing. This is accessed by pressing the keyboard combination 'Shift-F6'.

- Previous Topic — Will read in the first article in the previous news group. Like "Next Topic", NewsMaker will attempt to show a new article in the previous news group if it can. This is accessed by pressing the keyboard combination 'Shift-F5'.

The functions are hidden to avoid cluttering the menus with extra entries, not to prevent users from accessing them.

B.5.2   **Article Listings**

The next items in the menu are the current news group names in the News-Maker server. For example, NewsMaker might have the following news groups in the server: Commentary, Entertainment, International, National. Each of these news groups will have its own entry in the menu. When a news group is chosen, the following selection box will appear:

Figure 18: Article Selection Dialog
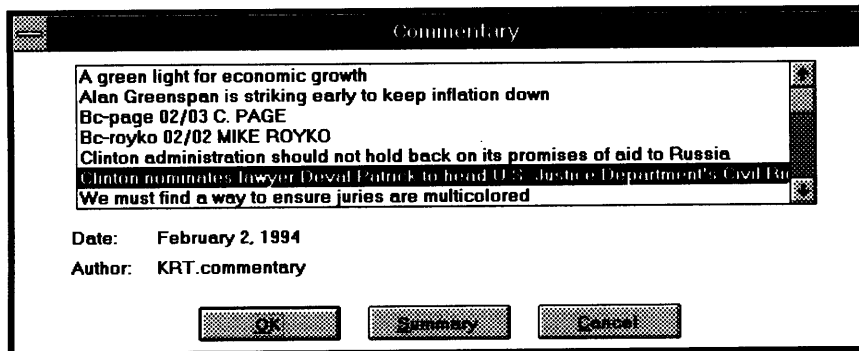
The article selection box contains the following information:

- A list box showing the headlines in the news group. If the user is already reading from the news group, the headline of the article being read will be highlighted.

- The date and author of the currently selected article is shown below the list box.

- Ok — Display the article, the article selection box will disappear. The

same action will occur if the user double clicks on a headline.

- Summary — Will bring up a brief summary of the current article. As this information is not provided by news suppliers, NewsMaker extracts the first three paragraphs for viewing. In the future, this space would be bring up the article's abstract.

- Cancel — Will close the article selection box without changing the article on the screen.

The list of articles is created each time the user selects a news group. This allows users to add or edit articles and have them instantly available to the rest of the network.

B.5.3   **More Groups**

NewsMaker will display ten news groups on the menu at any given time. When there are more news groups in the server than this, NewsMaker will place a "More groups" entry at the bottom of the "Groups" menu. When selected, "More groups" will bring up a list box showing all of the news groups in the server. Selecting one of the entries in the box will bring up the article selection box mentioned above.

Once the user enters a news group not on the menu, NewsMaker will adjust the "Groups" menu to show the selected news group and the news groups found around it. This way the user is able to access any article in the server.

B.6   **Newspaper**

The "Groups" menu provides an entrance to the news information, the "Newspaper" menu provides ways of joining multiple articles together.

Most of the newspaper functions will only work when a newspaper has been placed into memory by the user. Currently there are only two ways to do this, to load in a old newspaper from disk using "Open Newspaper", or to create a new newspaper using "Mark Article".

B.6.1   **Mark Article**

If users decide that the current article is one which should be placed into their newspaper, the first step is to tell NewsMaker that they want to use the article. The "Mark Article" function will take the current article and add it at the end of the user's newspaper. If there is no newspaper, "Mark Article" will create a new newspaper with the current article as the lead story.

Mark Article only works when there is an article displayed on the screen. If users are looking at a blank screen, or are working on a new article, this entry will be disabled.

B.6.2   **Open Newspaper**

Users are given their own newspaper files on disk for storing their articles of choice. When "Open Newspaper" is selected, NewsMaker will read in the current newspaper file and check to see if all of the articles are still present in the server. If they are, NewsMaker will open up the newspaper with the same articles.

As NewsMaker filters out old news after a few days, it is possible that an article which a user had marked no longer exists. In this case, NewsMaker will inform the user that one or more of the articles had been removed and that the newspaper was only partially read in.

If no newspaper file exists for a user, the menu entry will be disabled.

B.6.3   **Save Newspaper**

If a newspaper exists in memory, a user may save it to the disk for future recall. "Save Newspaper" will only work when the user has a newspaper in memory. NewsMaker only supports one newspaper per user.

B.6.4   **Sort Newspaper**

The structure of the newspaper must be more flexible than the order of article selection or the randomness of the day's news. "Sort Newspaper" allows the user to both view and adjust the newspaper.
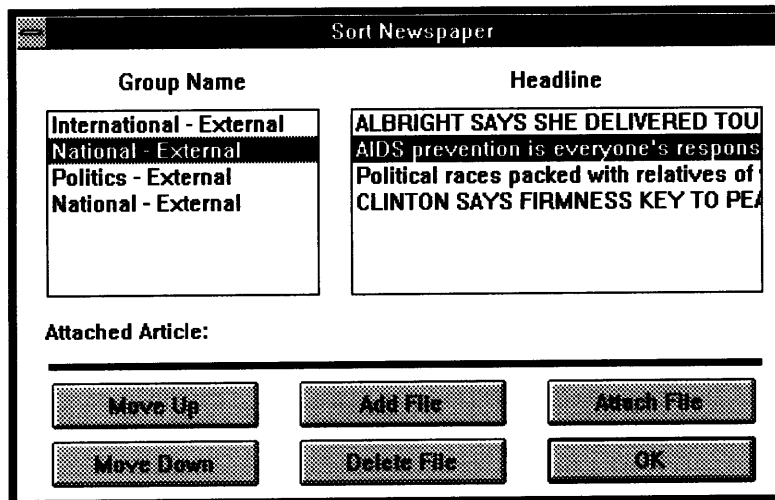

Figure 19: Sort Newspaper Dialog Box

Each article in the newspaper is given a listing in both the news group name box and the headline box. As users scroll through either list, they can select an article and NewsMaker will match up the news group and headline. In addi-

tion to viewing the order, NewsMaker provides users with the following functions:

- Move Up — Move the selected article up one position in the newspaper. The currently selected article is the one highlighted in either list box. If users need to move an article at the bottom of the list to the very top, they would have to perform this function multiple times.

- Move Down — Move the selected article down one item in the list.

- Add File — Allows the user to select an article from the server and add it after the current article.

- Delete File — Deletes the current article from the newspaper.

- Attach File — Attached files are files which are linked to the current article. For instance, users might have a body of text which they want to be the lead article and a graphic they want printed with the text. At the present time, attached articles are limited to graphic stills only.

- Ok — Approves the current newspaper and returns.

B.6.5   **Print Newspaper**

Once a user has a newspaper loaded into memory and sorted, the final step is to print the newspaper. NewsMaker will take the current newspaper settings and automatically print out a new newspaper.

The format of the newspaper is pre-defined by the software. "Print Newspaper" will only work if the user has a newspaper in memory and the class is allowed to print.

B.6.6   **Change Headline**

The headline that appears on the newspaper is the same for each member of a class. However, users are free to customize their headlines and create headlines for each newspaper they create. To change the headline, the user selects "Change Headline" from the menu and a dialog box will appear, where the user is free to type in a custom headline.

The new headline is stored in the user file for the class and will be saved until the user changes the headline again.

B.7   **Help**

The last entry on the menu bar is the Help function. This menu provides information to the user on the current state of NewsMaker.

B.7.1   **Article Info**

The "Article Info" entry will show the user the headline, author, date and news group for the article:

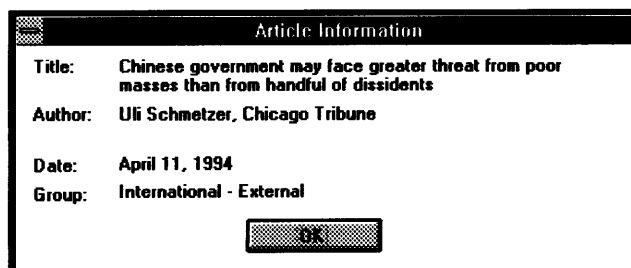| Title: | Chinese government may face greater threat from poor masses than from handful of dissidents |
Author:	Uli Schmetzer, Chicago Tribune
Date:	April 11, 1994
Group:	International - External

Figure 20: Article Information

If there is no article in memory, this menu entry will be disabled.

B.7.2   **Help**

A simple on-line help system is implemented to allow the users a place to go if they get stuck on any function. The help system utilizes the standard Windows help program, and gives basic pointers on the menu choices.

B.7.3   **Send Mail**

NewsMaker does not allow users to send mail back and forth between users, but private messages between users and the system administrators is possible. When "Send Mail" is selected, a dialog box will appear allowing users to compose mail and send it.

If there is mail for users from the system administrators, it will be displayed when they start their NewsMaker session.

B.7.4   **About**

Commonly found in Windows Programs, the "About" box brings up the copyright box for NewsMaker. In addition, the "About" box shows the user name as well as the current state of Windows memory usage.

In addition a hidden debugging function exists which will give more detailed descriptions on the state of NewsMaker. This will show the entire server structure, user information and article information. This is accessed with the keyboard combination "Alt-F9".

B.8   **Utilities**

There are a few utilities which are needed in addition to the NewsMaker program described above which aid in server maintenance. All of the utilities are

meant only for the system administrators and not for the regular user base of NewsMaker.

B.8.1   **Server Utility**

Window's utility for adjusting the server structure, used to add and remove news groups and articles as needed.

B.8.2   **Article Utility**

DOS utility for manipulating the server. This routine is used for automatic adjustment of the server structure. A few of the functions performed are:

- Extract Article — Extracts new articles sent by the main site to the client site.

- Extract Mail — Extracts mail from the system administrators for the users to pickup.

- Expire Articles — Using the expire day parameter in the server file, sees that all of the articles which are old are expired out and removed from the disk.

- Delete Functions — Ability to quickly remove single news group, or all of the server structure as needed.

- Sort Server — Sorts the server and news group files, placing the articles in the news group in order.

- Keyword Extraction — Goes through all of the articles in the server and sees that they all have keywords. Then creates list files containing cross-reference information for keyword searches.

- Mail Functions — Customized to the Hennigan mail routines for checking status of transmission of files to the main site.

B.8.3   **User Utility**

Windows utility for adjusting the class and user listings.

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