Project Number: MOW-0502 -51

Designing and Developing an Improved Website for the Worcester Public Schools

And Interactive Qualifying Project Report
Submitted to the Faculty
of the
WORCESTER POLYTECHNIC INSITITUTE
in participation of the requirements for the
Degree of Bachelor of Science
by

Nicholas Byra

and

Robert Martin

Robert Martin

Date: January 11, 2006

Professor Matthew Ward

Table of Contents

Introduction

A website is an important part of almost every organization these days. This is because when someone is trying to find out information about a company, organization, group or person, one of the first things they do is try to look at their website. A poor website can influence people negatively towards Worcester Public Schools. The process to redesign the Worcester Public Schools' website began during the first week of A term with a meeting in the District Administration Building with the two project sponsors that work for the School Department. The reason for the redesign was that the current website was about five years old and looked it. It was designed for a much smaller resolution than is normally used on computers these days, so a lot of the pages look very small in the browser window. Also from years of being edited by numerous people, lots of dead and incorrect links were present, as well as several completely different layouts on different sections of the site. All of these things made the website very hard to use which is the main reason for the redesign. We discussed what the Worcester Public School Department wanted in their redesigned website and what they had currently. To help give us an idea of what they wanted, they told us about several school districts' websites that they believed were of exceptional quality and thus wanted to attempt to emulate.

- Kyrene, AZ
- Kerrville
- Oswego
- Upper Merrion
- Austin, TX
- Kirksville, MO
- Dos Palos

- Kyrene, AZ
- Brewster
- Kent, WA

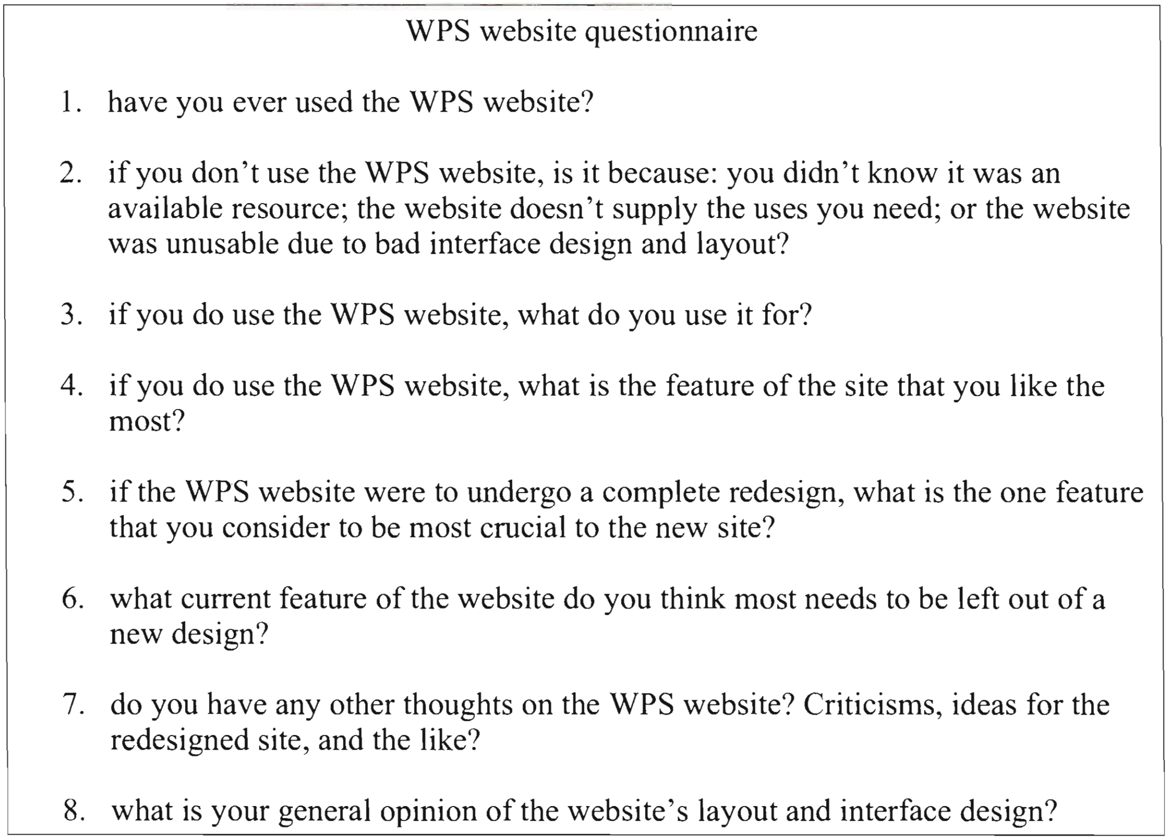
Table 1-1 List of school websites

We also began the project with an in-depth discussion about the procedure we were going to execute in order to complete this project. The first portion of the project was to go on an information-gathering mission to ascertain what the community that uses the School Department's website wanted. Then we planned a design for how the website's content and 'look-and-feel' would be laid out, and then we would prototype the design. Following that process of prototyping we implemented a small portion of the website's content and gave the prototype to testers so we can evaluate the strengths and weaknesses of our system before the remainder of the content was fleshed out. Initially we did not talk much about maintenance of the new site once it was up and running. After not much time it because obvious that it would be something that we needed to put effort into in order to prevent what happened to the old site from happening to the new one. This became a major focus of the project, making sure that the site would be very easy to update and expand.

Information Gathering Overview

There are countless different ways to gather information. We came to the decision that the best way to gather information about what people want in a website is to develop a questionnaire and interview some of the people who will be using the website. The design of the questionnaire began by considering the population for which the website will be a valuable resource. After discussing it, we came to the conclusion that the most likely groups of users for the site will be students, parents of students, teachers, administrators and other staff, webmasters, and families of prospective students who are considering moving into Worcester. One final group is potential teachers that might be looking to work in the Worcester School Department; this is probably the smallest group but arguably one of the most important because finding good teachers is always a concern.

The questionnaire that we wanted to develop would have two types of questions in it: open-ended opinion questions where the interviewee could add whatever information they saw fit, and discrete-answer questions that gather information about specific ideas or features that is much easier to analyze than open-ended questions. The discrete-answer questions involved the interviewee rating our ideas for website features on a scale of 0 to 5, so that we can find out how important the features suggested were. The open-ended questions were mainly concerned with the interviewee's in-depth opinion about the usefulness of the current website, what features of the current site that they liked, and any ideas that they had for features and/or content to add to the redesigned site that we did not mention in the discrete-answer questions. For the open ended questions we made an effort to have the phrasing not leading toward a particular answer that might skew our results. We wanted to try and avoid making the questions such that we got just the answers we wanted out of them, Our research showed that this was a common problem in questionnaires. This is the original version of our questionnaire:



WPS website questionnaire

1. have you ever used the WPS website?
2. if you don't use the WPS website, is it because: you didn't know it was an available resource; the website doesn't supply the uses you need; or the website was unusable due to bad interface design and layout?
3. if you do use the WPS website, what do you use it for?
4. if you do use the WPS website, what is the feature of the site that you like the most?
5. if the WPS website were to undergo a complete redesign, what is the one feature that you consider to be most crucial to the new site?
6. what current feature of the website do you think most needs to be left out of a new design?
7. do you have any other thoughts on the WPS website? Criticisms, ideas for the redesigned site, and the like?
8. what is your general opinion of the website's layout and interface design?

Figure 2-1 Original Questionnaire

There were also other factors that we considered while we were planning our information gathering mission. We wanted to make sure that we interviewed at least one person, preferably more, from each of the groups of potential users that are mentioned above. This way the final website would have a fair distribution of features that catered to the needs of each type of user. For example, the redesigned site would not be very good if it was an excellent resource for students, but teachers could not do anything productive with it. All in all, we were able to get every one of our groups into our sample with the exception of the prospective student's parents and prospective teachers. These would have been very difficult groups of people to interview for obvious reasons. Here is the breakdown of the people that we interviewed.

Type of Person	*Number of people interviewed*
Administrator	2
Teacher	2
Student	1
Other Faculty	5

Table 2-1 Breakdown of people interviewed

The only problem was that we were only able to interview one student while we interviewed several teachers and administrators. This was mainly a result of us not having as good of access to them because we could not just pull them out of classes in order to be interviewed. Clearly the schools did not want us hanging around the hallways trying to grab people as they were going from class to class. Another facet of interviewing potential users that occurred during our information-gathering mission was the evolution of our questionnaire. For instance, if one person we interviewed made a really good suggestion for a potential website feature, we included it in the list of features to be rated by future interviewees. The reason for this was that we wanted to gather as much useful information as possible, and if we continuously updated our questionnaire, the chances of an interviewee forgetting to mention something that they had on their mind is drastically decreased when we prompt them with something that would get their mind going. The other main reason for having as much of the critical information as possible being prompted by us is because a lot of people who get interviewed for various reasons are sometimes reluctant to elaborate on open-ended questions. Because of this, we engineered the questionnaire to suit our needs, even if the interviewee doesn't supply much with the open-ended questions. The open-ended questions are more like icing on the cake rather than totally necessary ingredients. This is how the final version of the questionnaire turned out:

QUESTIONAIRE VERSION 2

1. Have you ever used the Worcester public school website?

2. If not, why? Was it because: you didn't know the website was an available resource? The site didn't supply the usefulness you required? Or was the site unusable to to poor interface design and/or layout?

3. If so, what do you use the website for?

4. On a rating scale of 0 to 5 (0 is not needed at all, 5 is very essential), please rate the following website features for the wps website:

   □ Directions / Locations
   □ Athletic info (scores, schedule, away game directions)

□ After school program info
□ School closing procedures and closings
□ Academic calendar
□ School Bus routes
□ School lunch menu
□ Class information
□ Program information
□ Faculty / staff information
□ Administrative forms
□ Newsletter / events

5. Is there anything that we didn't include on that list that you'd really think would be excellent for the wps website?

6. Is there anything on the current website that you think needs to be not included in the new version?

7. How easy is the website to use for finding information that you need? (0 to 5 scale)

8. Have you ever been unable to find any information on the website that you knew was there?

Figure 2-2 Questionnaire Version 2

Another idea we discussed for information gathering was to send out a mass email to the school department employees and teachers to try and get as large a sample size as possible for our information, but unfortunately that idea never materialized, and wasn't executed mainly as a result of difficulties getting approval for it and getting the system for recording the results to work properly.

Information Gathering Results

Overall, the information gathered from the interviews conducted was most informative and helpful. The people interviewed with the questionnaire were a principal from one of the district's elementary schools, two teacher trainers who work at the District Administration Building, the school department's information systems manager, two teachers from Doherty Memorial High School, a student from Doherty High School, one of the people who work on keeping the website current, a secretary who does work on the website, and the Superintendent of the Worcester School District.

By interviewing the principal of the Quinsigamond Elementary School, we found out that the current website is mostly used by principals to check emails, get information about other schools in the district for comparison purposes, and to keep informed about district-wide information. The checking of email is actually hosted on another site and not under the scope of this project. The principal thought that features we suggested for the new website, such as directions to the schools, calendar information, school lunch menu postings, and faculty information, were very important, while features such as athletic information and school closing information weren't very important to have on the web. She also suggested that information about after school programs, night classes for adults, MCAS information and professional development information would be very important features that we hadn't thought of for our list. For complete questionnaire results for this participant see **Appendix A-1.**

During our interviews with the teacher trainers at the Administration Building, we were informed that the website is used by administration staff mostly for checking email, distributing teaching software and how-to links on using said software, and the technology newsletter. The trainers thought that features on our list such as lunch menus, athletic information, directions to the schools, faculty and class information were all very important, while features such as school closings, bus routes, and after school program information weren't very crucial for the website. Neither of the teacher trainers had any additional features to suggest to us, but they did comment on the clumsy navigation of the current site, and also on the fact that the individual schools shouldn't have input into the layout of their sites because doing so makes the whole site lacking in uniformity, which was something that they thought was important. The teacher trainers also emphasized the need for easy updating of the website and for a highly uniform look-and-feel. For complete questionnaire results for these two participants see **Appendix A-2** and **Appendix A-3.**

From the interview with the secretary who works in the Administration Building and who updates some of the websites content, we learned several important pieces of information. First of all, she said that the features we had suggested on our questionnaire such as posting directions to the schools, posting the lunch menus and bus routes, academic calendar and an individual school's policy on school closings were all very important. She also added that items such as class information, faculty information, and administrative forms weren't so important. The features that she added to our own list were quite intriguing, however. She suggested that the website contain handbook excerpts for each of the schools, as well as the school supply list that each student gets at the end of the school year, and also that the website should contain the requirements for professional development programs in which a teacher must participate. She also commented that for home use, the current website was fairly good. This interview, by the way, was the only one where the comments about the website were generally positive. She also said, as did almost everyone else we interviewed, that the adaptability and flexibility of the current website was extremely poor. For complete questionnaire results for this participant see **Appendix A-4.**

Our interview with one of the workers at the Parent Information Center was also very productive. When we asked her to rate the items on our list of suggested features for the new website, she said that every single one of them was very important with the sole exception of faculty information. She also told us that she mainly uses the School Department website for checking her email, looking up calendar events, and to work on the Federal Programs section of it. One of the strongest comments that she made during the interview was that the website was not user friendly both internally and externally, and that one of the largest problems with the fact that a user could accidentally stumble on some very outdated information because the links and the navigation updates aren't coordinated with the content updates very well. For complete questionnaire results for this participant see **Appendix A-5.**

Next we conducted interviews at Doherty Memorial High School. The first two interviews were with teachers involved with the School's portion of the website. The main uses for the website that we gathered from the teachers were that the journalism class used the website. They used it to find teacher names and information, to gather sports schedules, the school's curriculum, and the school newspaper. When we discussed the list of suggested features for the new website, the teachers strongly recommended all of our suggestions, with the exceptions of schools lunch menus and school bus routes; those items weren't believed to be useless, just less important than the rest of the ones on the list. The teachers suggested many features that we hadn't considered. One of the teachers suggested that each school's website have an alumni success page to highlight the successes of the alumni from that school. A link to the Department of Education's website for re-certification programs, and the ability for teachers to post lesson plan resources were also suggested. One of the strongest recommendations was for teacher-only portals into the sections of the website where administrative forms are kept. It was also suggested that we "get rid of the mundane layout" and also to have a reliable search engine on the site should someone have trouble finding any content. For complete questionnaire results for these two participants see **Appendix A-6** and **Appendix A-7.**

We also interviewed a student from Doherty High School. According to her, the only uses that the school website really had for students was at the individual school level, and that she never used anything that was on the main Administration website. She mainly used the website for the connection to the school library so that she could do research and check out books. When we asked her to rate the various items on our list of features, she said that items such as athletic information, directions to the school, after school program information, school closing policies, bus routes, and information about available elective courses were highly important, while items such as the school lunch menus, curriculum and syllabus information, and newsletter/events information were not important at all. One interesting item to note was that the events calendar, which is mainly geared towards students, was not well received by this student. The reason that she gave us was that the teachers all have the calendars posted in the classrooms, and therefore that data doesn't need to take up web space. This is one of the things we are not sure would be consistent with all students and is one of the reasons it might have been better to interview more students. She had no real negative comments on the layout of the current website, and the only thing that she has to suggest be added to the website was information such as SAT schedules and other test information of that nature. For complete questionnaire results for this participant see **Appendix A-8.**

Finally, our last interview was with the superintendent of the Worcester School District. We didn't really follow the questionnaire with this interview because the superintendent had a lot of information prepared for our meeting and he basically answered all of our questions without any prompting required, which was very nice indeed. We were able to gather some extremely helpful information from the superintendent, such as content related items that he wants to see on the new website. Some of these items that the superintendent deemed important were the bus routes and the lunch menus, as well as alumni accomplishments pages, and awards and kudos pages for the staff and faculty of the schools. He also wanted to promote the image of the city of Worcester, as well as the information about the school district from the Department of Education website and pages describing the 'Superintendent's Goals'. The superintendent also suggested many ideas that were not content-related, such as telling us that the school calendars and the individual school websites needed to be *very* easily accessible. The website should at least attempt to cater to the needs of foreign-speaking families in Worcester. He said that one of the most important aspects of the site's user interface should be that the links in the menus are structured in a friendly, non-technical manner to try and promote the user friendliness of the website and also to attract potential users to the inner parts of the site. He suggested using questions such as "Who are we?" and "Where did they go from here?" rather than "About Us" or "Alumni Placement".

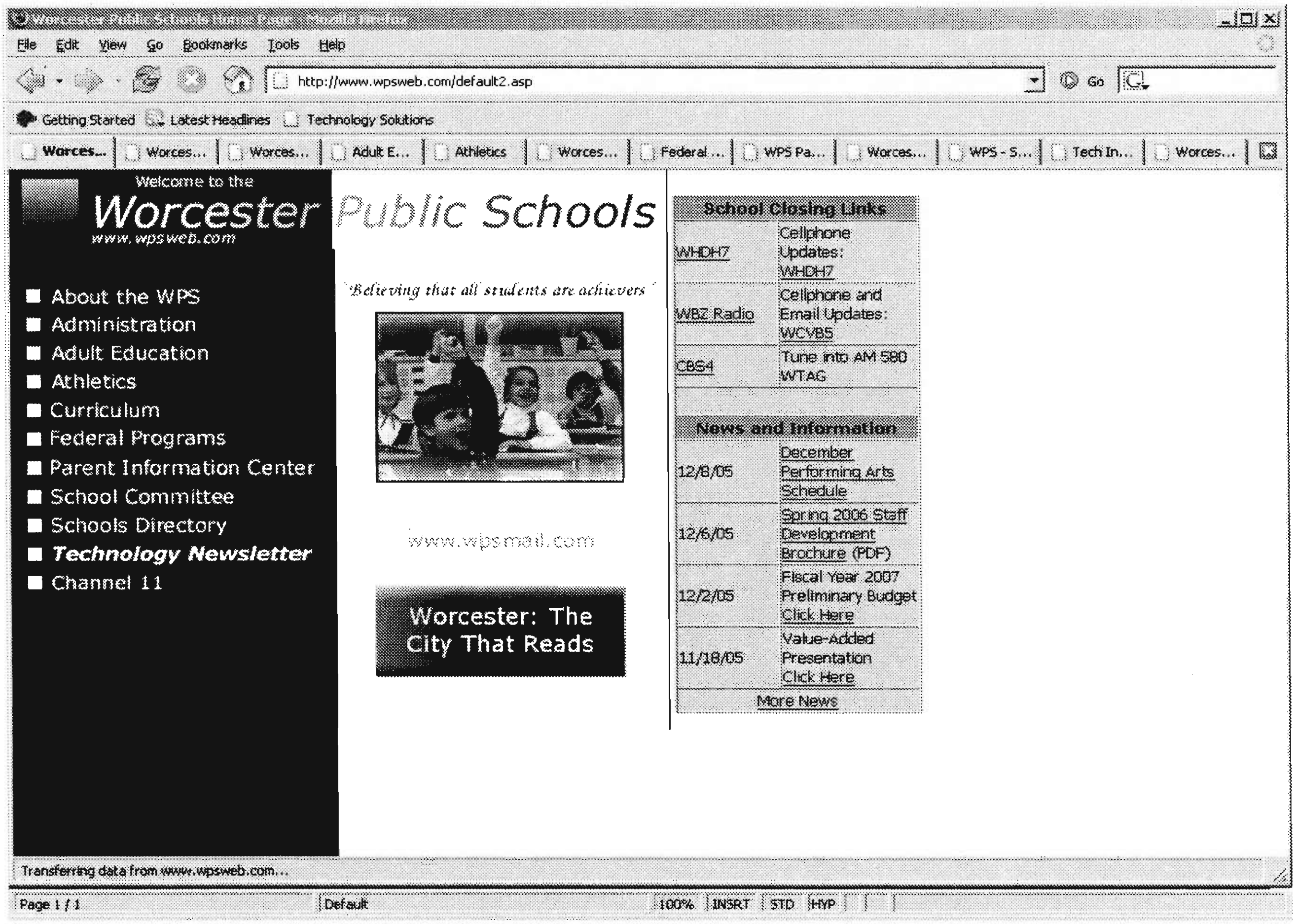
Originally, we were also scheduled to join in during the school department's Parent Organization meeting to discuss the needs of the new website with the only group of end-users not yet covered: the parents of the students in the school system. However, when we made contact with the parent group about the meeting on October 11th, the co-chairman of the organization suggested that we push back the meeting until November 1st so that the members of the organization could have more time to think about the needs of the new website and to organize their thoughts on the state of the current website. Our only concern with that is by the time that the delayed meeting rolled around, will we be too far into the development of the website for the new information to be of any use? Nevertheless, we still intended to gather the information from the meeting. Us speaking at the meeting ended up never actually happening as a result of complications with us getting to the location.

Our information gathering mission across the city of Worcester gave us valuable insights as to what type of content the various types of users for this website think is important and not important. We also got some general ideas as to what the system should do upon its completion. From our interviews we know that the people involved with the updating of the content of the site want the system to be extremely simple. There should be as few steps as possible involved in updating and maintaining the site. They don't want to have to write HTML code to create new pages or to update the navigation system. Most people involved are not skilled enough at HTML to be trusted to update the website in that language and there are more likely to be errors if all the updating was in raw HTML. Also, if the school department ever wants to overhaul the navigation hierarchy, they'd have to hire some person or some group of people to re-write the HTML code for the links and menus on *every page* in the website. That is something that would take a lot of time to do and would be very prone to errors and dead links similar to the current system, in which redesigning the hierarchy would involve editing every page. Obviously, this kind of inflexible system is exactly what the school department does not want. Our interviews with the users of the site, such as the student from Doherty High, as well as the teachers and staff who use the website in addition to working on its maintenance, told us that the new website has to be very easy to navigate. Now, this probably seems like an obvious statement, but the fact that the users of the site mentioned the need for a good navigation system emphasizes the fact that the current websites navigation is very clumsy and disorganized and highly prone to dead links. All in all, the single most important part of the website's new design, as gathered from our interviews, is not the usefulness of the content, or the graphical layout and color scheme, but the ease of use for both end-users and maintenance workers who need to update the content and the hierarchy of the website. After all, if these are not easy to do, the website will not be updated nearly as much and end-users will not use it as much, resulting in a failed website.

Problems With the Current Website

During our weekly meetings at the District Administration Building, we discussed both our progress on the project throughout the term, but also the overall design of the new system.

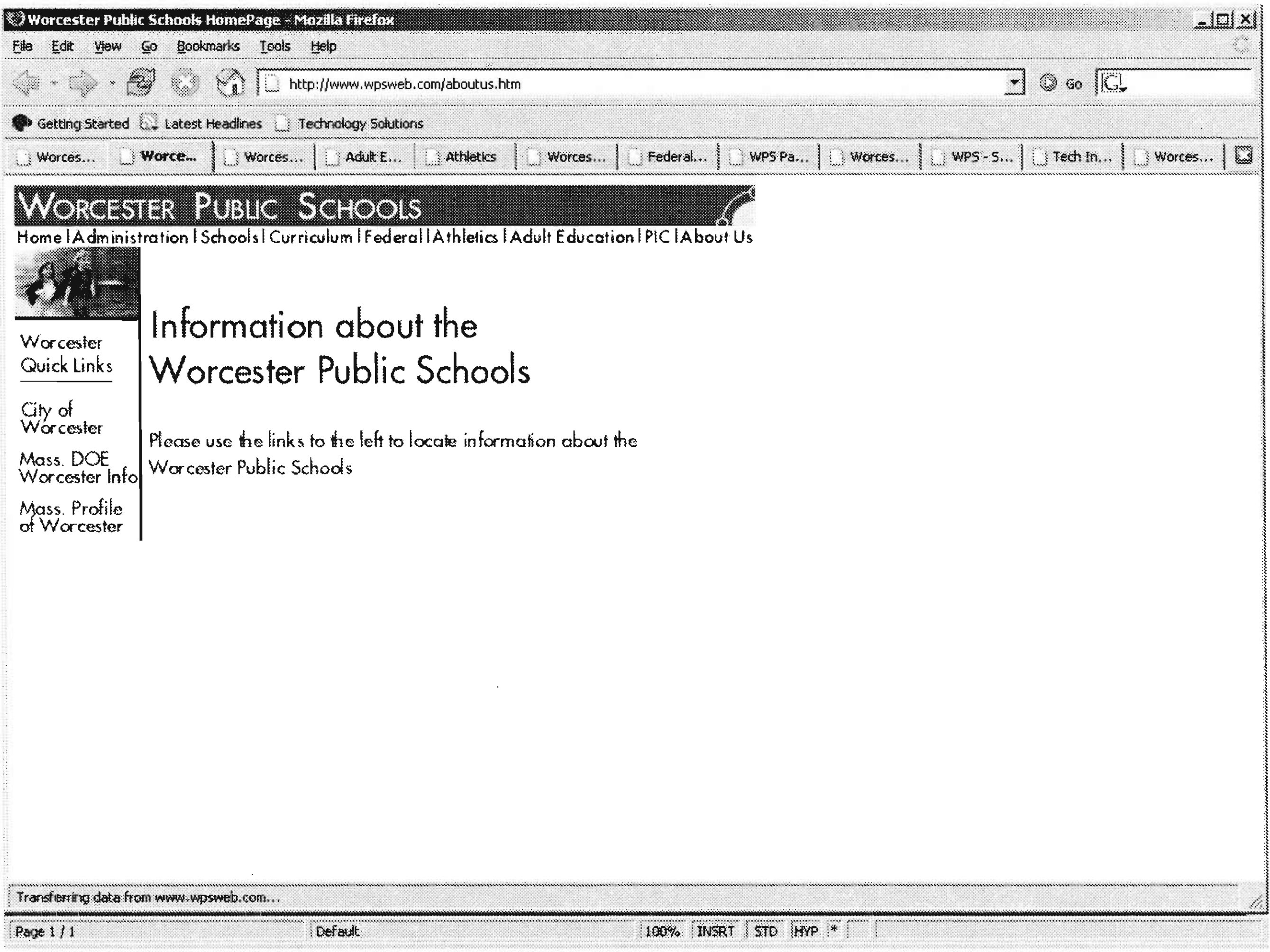
The first things we discussed was what we thought was wrong with the current website. The two biggest issues were that it was non-uniform and unorganized. Figures 4-1 through 4-11 present a brief walk though of the current website and what we found to be wrong with it.



School Closing Links	
WHDH7	Cellphone Updates: WHDH7
WBZ Radio	Cellphone and Email Updates: WCVB5
CBS4	Tune into AM 580 WTAG

News and Information	
12/8/05	December Performing Arts Schedule
12/6/05	Spring 2006 Staff Development Brochure (PDF)
12/2/05	Fiscal Year 2007 Preliminary Budget Click Here
11/18/05	Value-Added Presentation Click Here
More News	

Figure 4-1 This is the main page of the current Worcester Public Schools website. The navigation system is on the left and news is on the right. There is really not much wrong with this as a main page.



WORCESTER PUBLIC SCHOOLS

Home | Administration | Schools | Curriculum | Federal | Athletics | Adult Education | PIC | About Us

Worcester Quick Links

City of Worcester

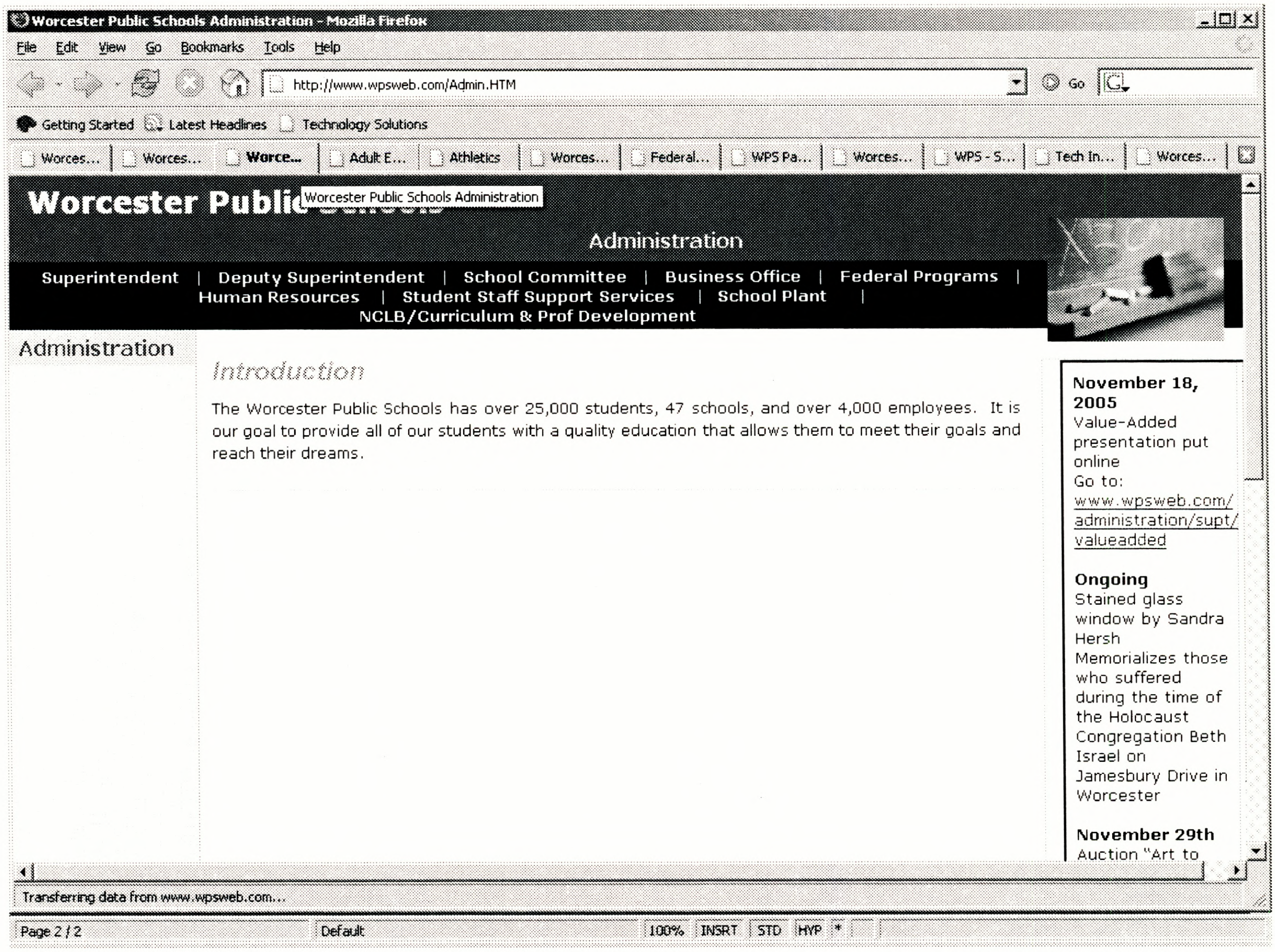
Mass. DOE Worcester Info

Mass. Profile of Worcester

Information about the Worcester Public Schools

Please use the links to the left to locate information about the Worcester Public Schools

Figure 4-2 This is the page that the first link on the main page "About the WPS" opens up. The color scheme is different and there are now two navigation systems, one on the top of the page and one on the left side. The menu on top has some of the links that are on the main image; but not all of them.


Worcester Public Schools Administration - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.wpsweb.com/Admin.HTM
Go
Getting Started Latest Headlines Technology Solutions
Worces... Worces... Worce... Adult E... Athletics Worces... Federal... WPS Pa... Worces... WPS - S... Tech In... Worces...
Worcester Public Schools
Worcester Public Schools Administration
Administration
Superintendent | Deputy Superintendent | School Committee | Business Office | Federal Programs | Human Resources | Student Staff Support Services | School Plant | NCLB/Curriculum & Prof Development
Transferring data from www.wpsweb.com...
Page 2 / 2 Default 100% INSRT STD HYP *

Administration

Introduction

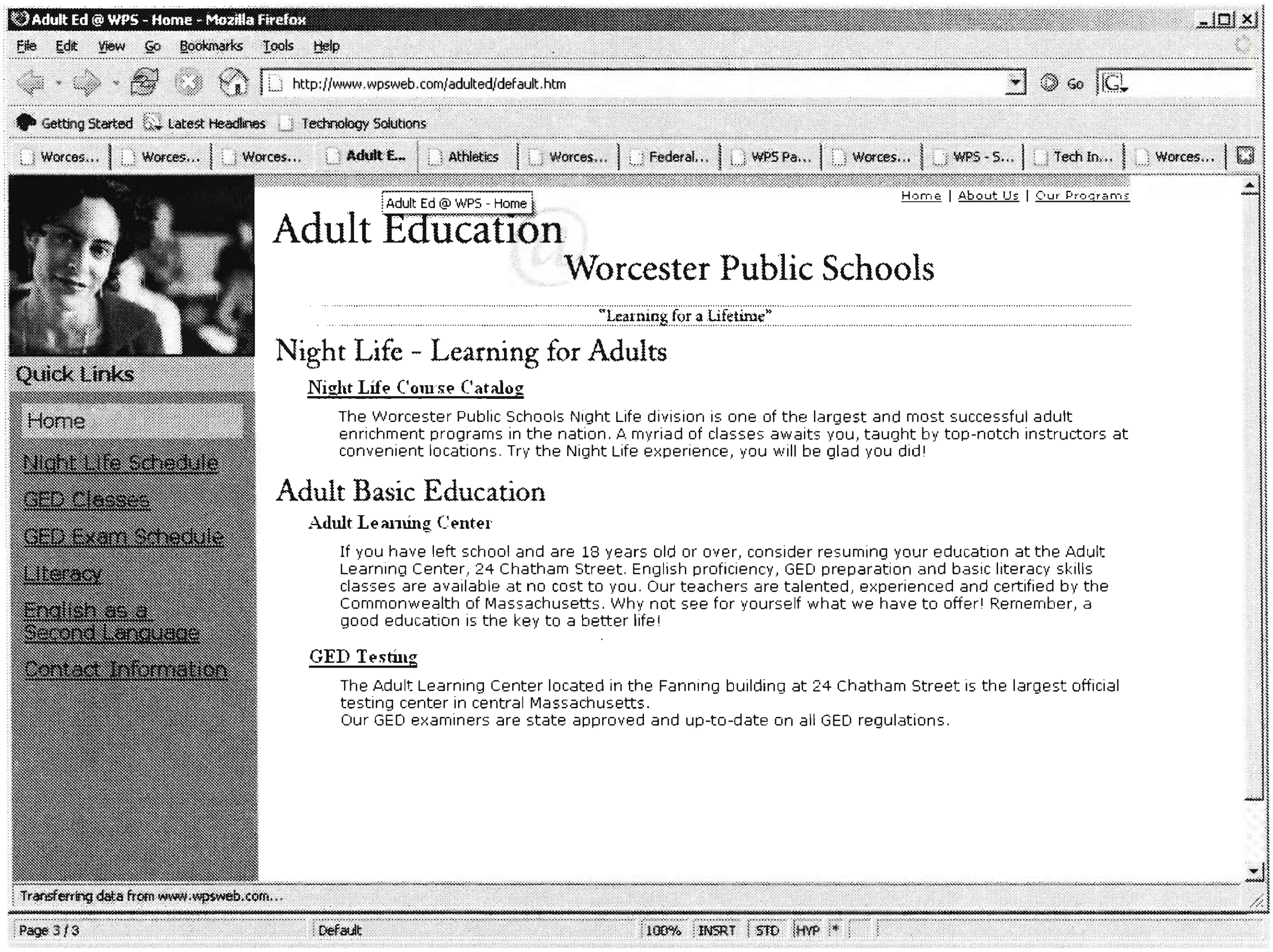
The Worcester Public Schools has over 25,000 students, 47 schools, and over 4,000 employees. It is our goal to provide all of our students with a quality education that allows them to meet their goals and reach their dreams.

November 18, 2005
Value-Added presentation put online
Go to: www.wpsweb.com/administration/supt/valueadded

Ongoing
Stained glass window by Sandra Hersh
Memorializes those who suffered during the time of the Holocaust
Congregation Beth Israel on Jamesbury Drive in Worcester

November 29th
Auction "Art to

Figure 4-3 This is how the second link "administration" appears. As can be seen it has a very different look from the first two pages. One might even go as far as to say that it does not look like it is even part of the same site. There are now only links at the top and non on the left side of the page as there have been in the two previous pages.


Adult Ed @ WPS - Home - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.wpsweb.com/adulted/default.htm
Getting Started
Latest Headlines
Technology Solutions
Worces... Worces... Worces... Adult E... Athletics Worces... Federal... WPS Pa... Worces... WPS - S... Tech In... Worces...
Adult Ed @ WPS - Home
Home | About Us | Our Programs
Quick Links
Home
Night Life Schedule
GED Classes
GED Exam Schedule
Literacy
English as a Second Language
Contact Information
Transferring data from www.wpsweb.com...
Page 3 / 3
Default
100%
INSRT
STD
HYP
*

Adult Education

Worcester Public Schools

"Learning for a Lifetime"

Night Life - Learning for Adults

Night Life Course Catalog

The Worcester Public Schools Night Life division is one of the largest and most successful adult enrichment programs in the nation. A myriad of classes awaits you, taught by top-notch instructors at convenient locations. Try the Night Life experience, you will be glad you did!

Adult Basic Education

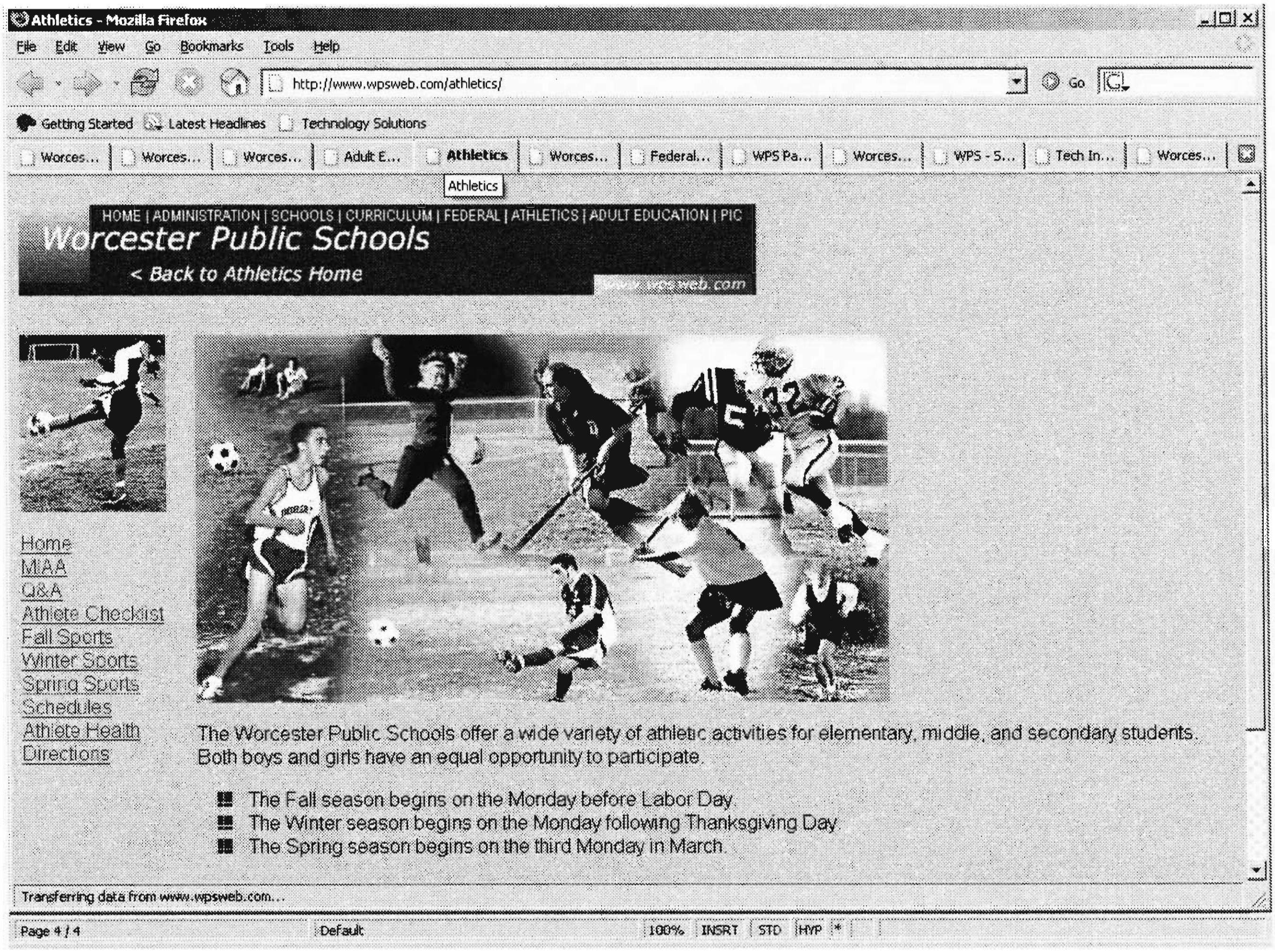
Adult Learning Center

If you have left school and are 18 years old or over, consider resuming your education at the Adult Learning Center, 24 Chatham Street. English proficiency, GED preparation and basic literacy skills classes are available at no cost to you. Our teachers are talented, experienced and certified by the Commonwealth of Massachusetts. Why not see for yourself what we have to offer! Remember, a good education is the key to a better life!

GED Testing

The Adult Learning Center located in the Fanning building at 24 Chatham Street is the largest official testing center in central Massachusetts.
Our GED examiners are state approved and up-to-date on all GED regulations.

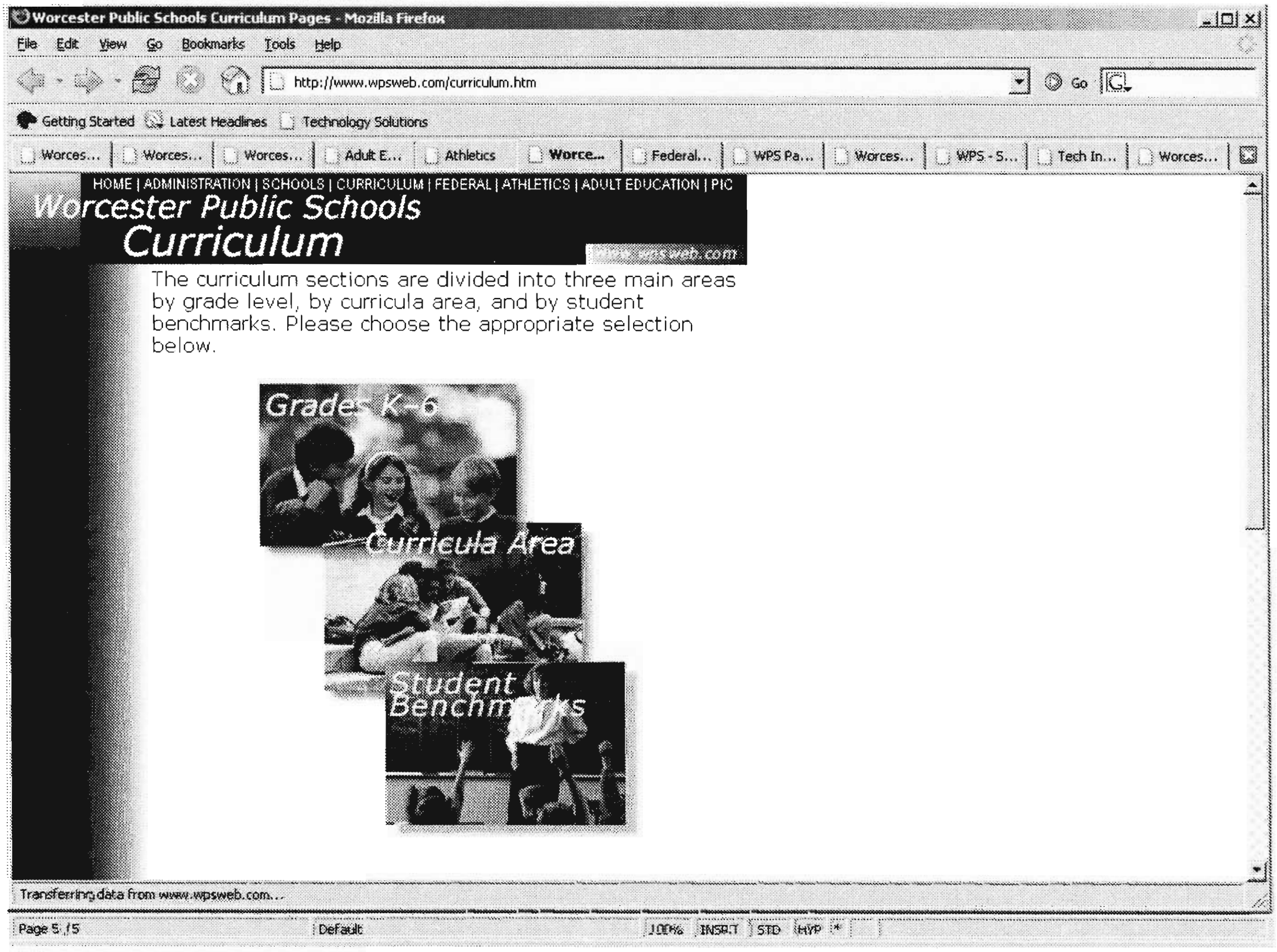
Figure 4-4 The third link "Adult Education" open up what is again a look that is completely different from any of the previous. The links are once again on the left side of the page, and there are links on the top right side of the page.



The Worcester Public Schools offer a wide variety of athletic activities for elementary, middle, and secondary students. Both boys and girls have an equal opportunity to participate.

- The Fall season begins on the Monday before Labor Day.
- The Winter season begins on the Monday following Thanksgiving Day.
- The Spring season begins on the third Monday in March.

Figure 4-5 Another completely different look is found in "Athletics," with links on the left side again. The blue Worcester public schools graphic on the top of the page looks completely out of place and doesn't match the color scheme of the page at all.



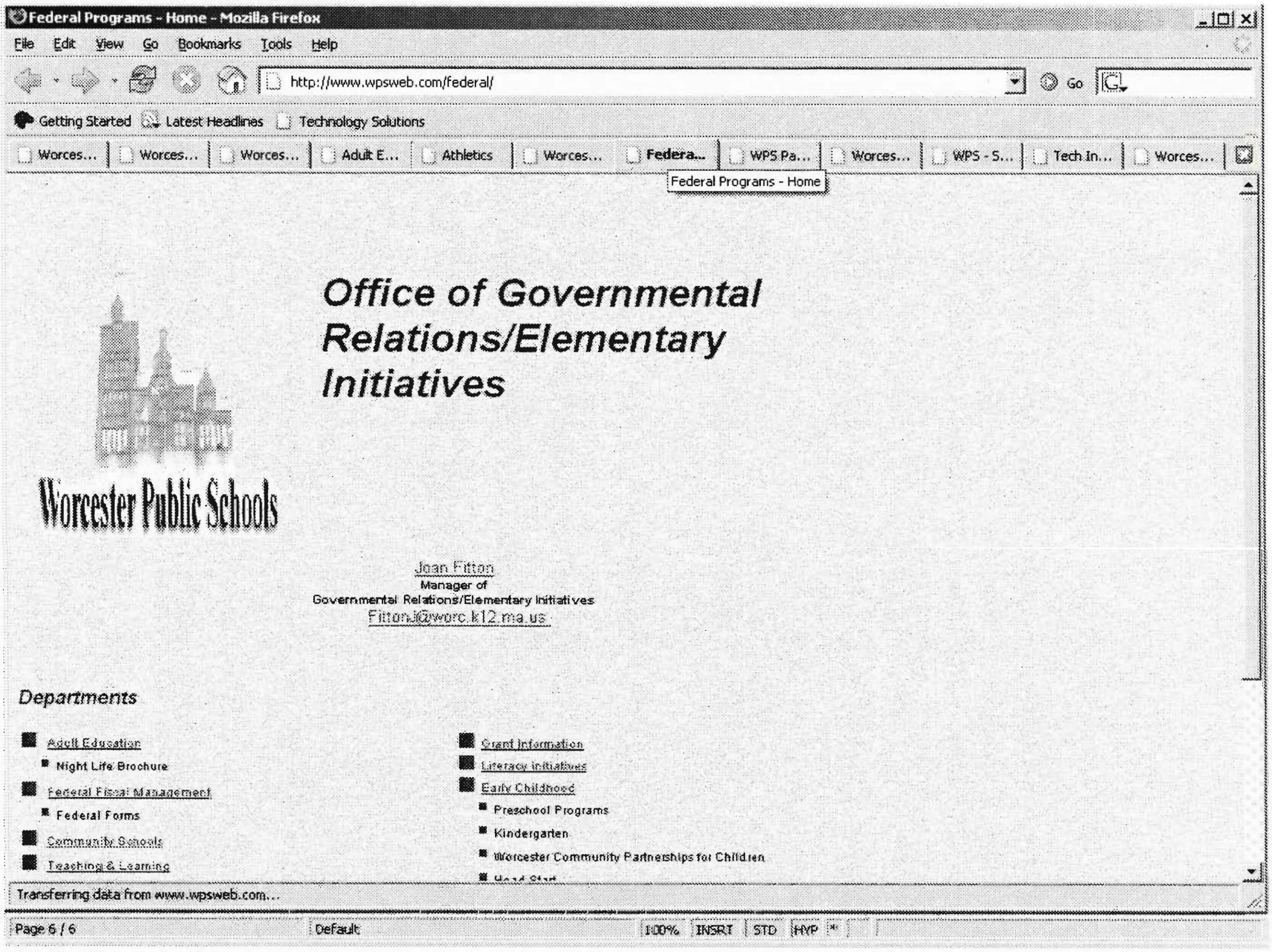
Worcester Public Schools Curriculum Pages - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.wpsweb.com/curriculum.htm
Go
Getting Started
Latest Headlines
Technology Solutions
Worces...
Worces...
Worces...
Adult E...
Athletics
Worce...
Federal...
WPS Pa...
Worces...
WPS - S...
Tech In...
Worces...
HOME | ADMINISTRATION | SCHOOLS | CURRICULUM | FEDERAL | ATHLETICS | ADULT EDUCATION | PIC
www.wpsweb.com

Worcester Public Schools
Curriculum

The curriculum sections are divided into three main areas by grade level, by curricula area, and by student benchmarks. Please choose the appropriate selection below.

Transferring data from www.wpsweb.com...

Figure 4-6 This page does something different from all of the previous in that it uses images as links. This could be confusing to some people if they have been using other sections of the site and then came here.


Federal Programs - Home - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.wpsweb.com/federal/
Go
Getting Started
Latest Headlines
Technology Solutions
Worces... Worces... Worces... Adult E... Athletics Worces... Federa... WPS Pa... Worces... WPS - S... Tech In... Worces...
Federal Programs - Home
Worcester Public Schools
Transferring data from www.wpsweb.com...
Page 6 / 6
Default
100%
INSRT
STD
HYP

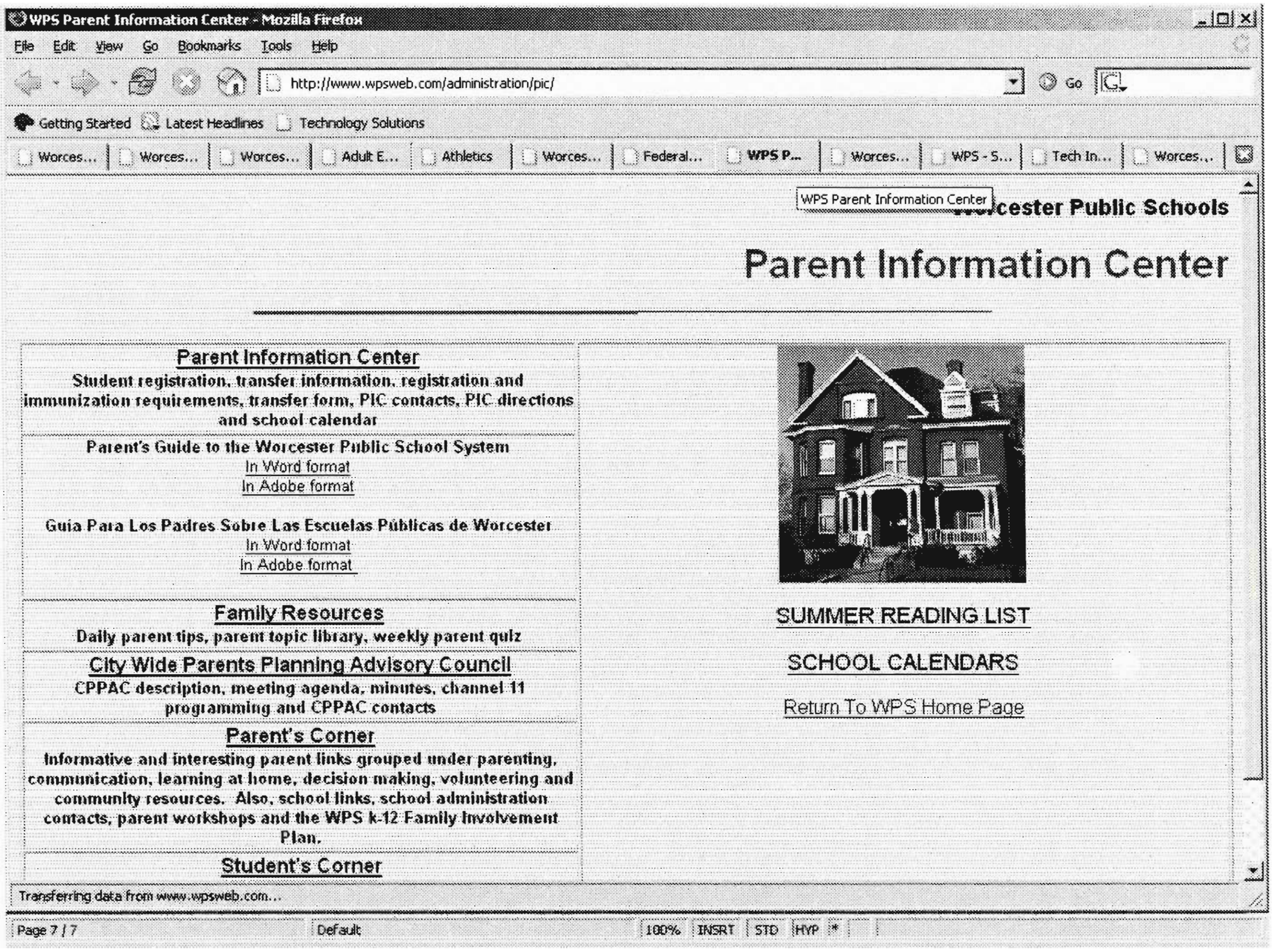
Office of Governmental Relations/Elementary Initiatives

Joan Fitton
Manager of
Governmental Relations/Elementary Initiatives
FittonJ@worc.k12.ma.us

Departments

- Adult Education
  - Night Life Brochure
- Federal Fiscal Management
  - Federal Forms
- Community Schools
- Teaching & Learning
- Grant Information
- Literacy initiatives
- Early Childhood
  - Preschool Programs
  - Kindergarten
  - Worcester Community Partnerships for Children
  - Head Start

Figure 4-7 This page has the links at the bottom as opposed to the left side or the top of the page, once again providing a completely different look.



...rcester Public Schools

Parent Information Center

Parent Information Center

Student registration, transfer information, registration and immunization requirements, transfer form, PIC contacts, PIC directions and school calendar

Parent's Guide to the Worcester Public School System
In Word format
In Adobe format

Guia Para Los Padres Sobre Las Escuelas Públicas de Worcester
In Word format
In Adobe format

Family Resources

Daily parent tips, parent topic library, weekly parent quiz

City Wide Parents Planning Advisory Council

CPPAC description, meeting agenda, minutes, channel 11 programming and CPPAC contacts

Parent's Corner

Informative and interesting parent links grouped under parenting, communication, learning at home, decision making, volunteering and community resources. Also, school links, school administration contacts, parent workshops and the WPS k-12 Family Involvement Plan.

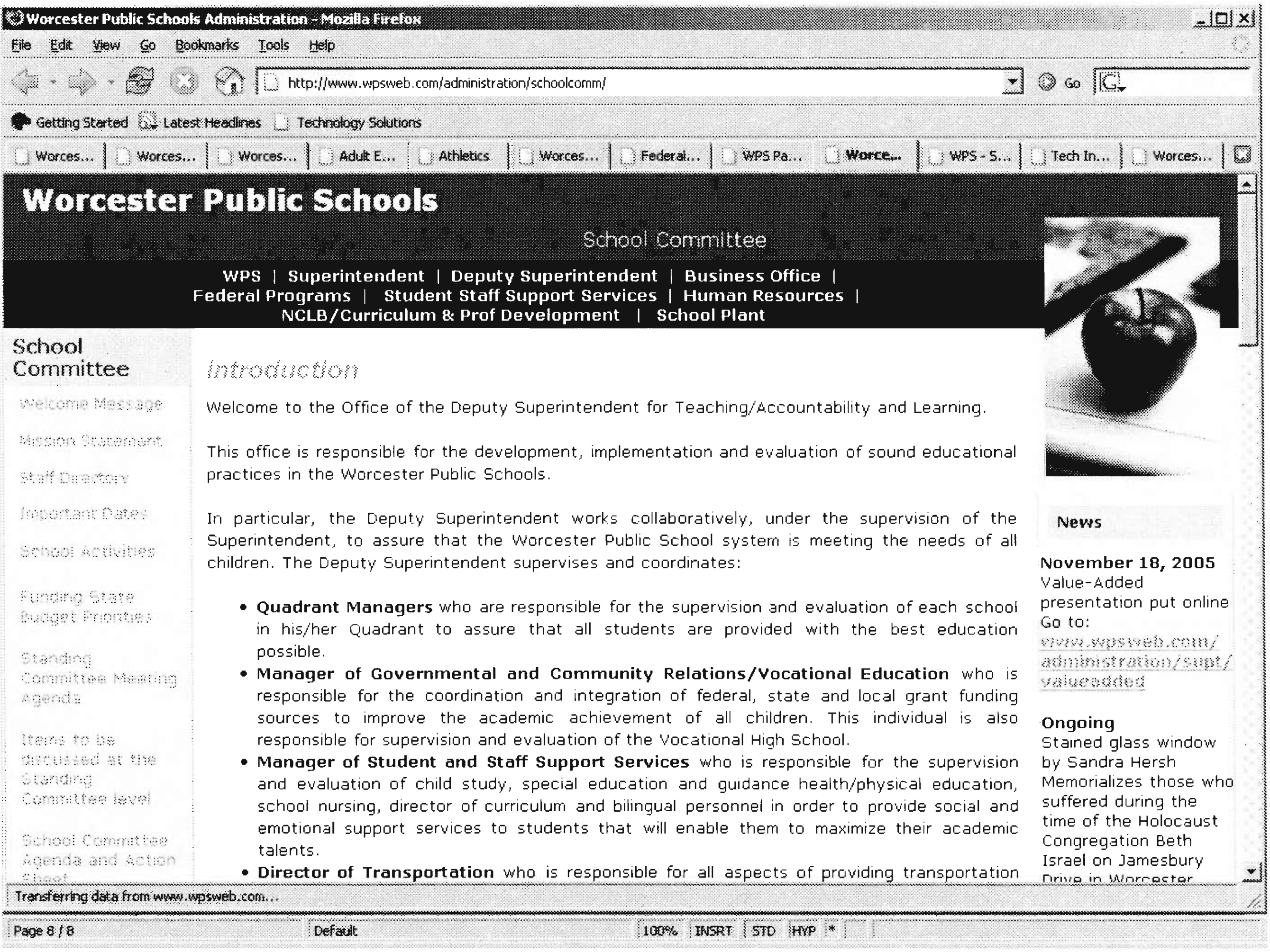
Student's Corner

SUMMER READING LIST

SCHOOL CALENDARS

Return To WPS Home Page

Figure 4-8 This page uses a split cell table approach that is not really similar to anything else on the site.


Worcester Public Schools Administration - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.wpsweb.com/administration/schoolcomm/
Go
Getting Started Latest Headlines Technology Solutions
Worces... Worces... Worces... Adult E... Athletics Worces... Federal... WPS Pa... Worce... WPS - S... Tech In... Worces...
Worcester Public Schools
School Committee
WPS | Superintendent | Deputy Superintendent | Business Office | Federal Programs | Student Staff Support Services | Human Resources | NCLB/Curriculum & Prof Development | School Plant
School Committee
Welcome Message
Mission Statement
Staff Directory
Important Dates
School Activities
Funding State Budget Priorities
Standing Committee Meeting Agenda
Items to be discussed at the Standing Committee level
School Committee Agenda and Action Sheet
Transferring data from www.wpsweb.com...
Page 8 / 8
Default
100%
INSRT
STD
HYP
*

Introduction

Welcome to the Office of the Deputy Superintendent for Teaching/Accountability and Learning.

This office is responsible for the development, implementation and evaluation of sound educational practices in the Worcester Public Schools.

In particular, the Deputy Superintendent works collaboratively, under the supervision of the Superintendent, to assure that the Worcester Public School system is meeting the needs of all children. The Deputy Superintendent supervises and coordinates:

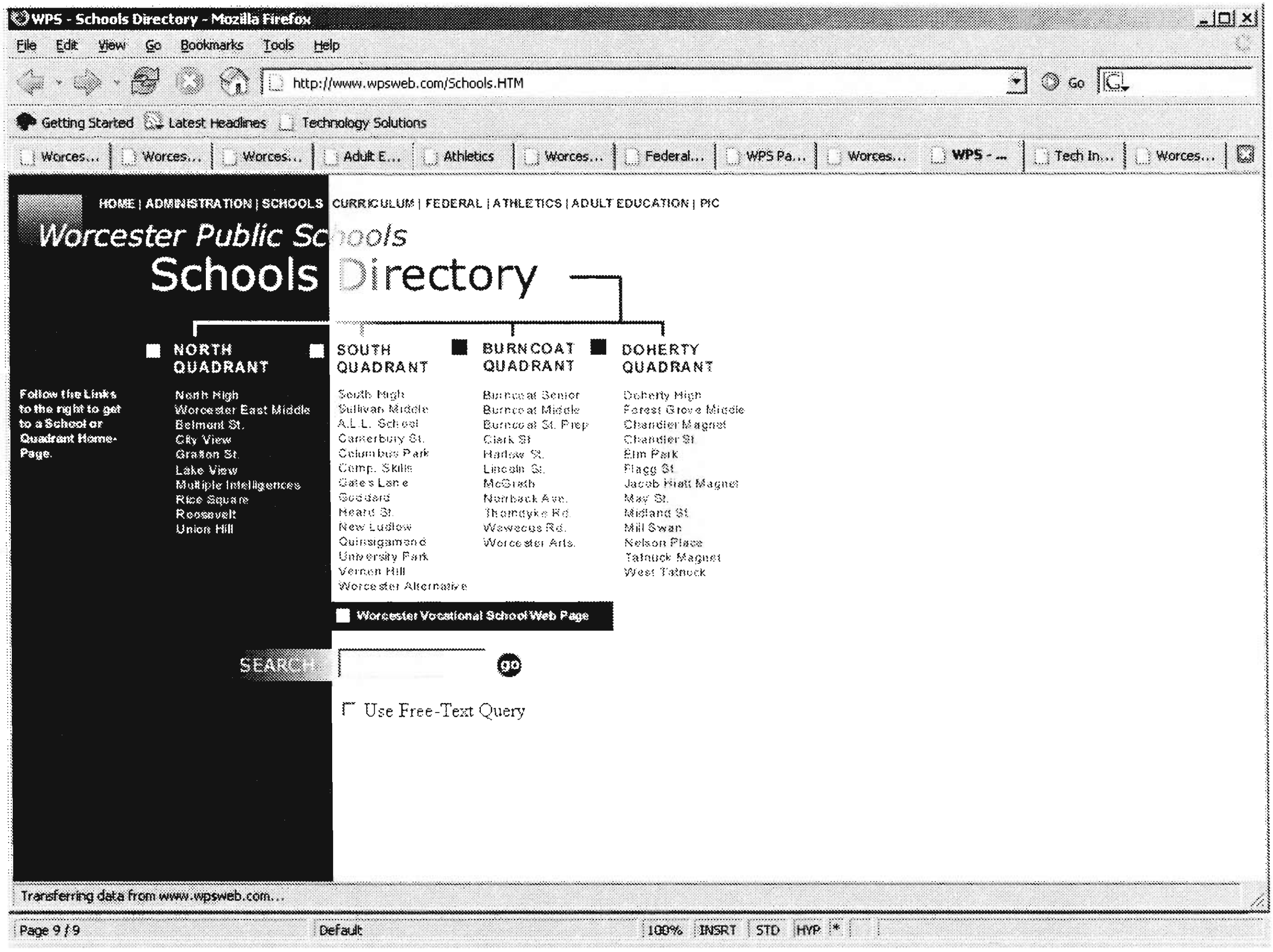
- **Quadrant Managers** who are responsible for the supervision and evaluation of each school in his/her Quadrant to assure that all students are provided with the best education possible.
- **Manager of Governmental and Community Relations/Vocational Education** who is responsible for the coordination and integration of federal, state and local grant funding sources to improve the academic achievement of all children. This individual is also responsible for supervision and evaluation of the Vocational High School.
- **Manager of Student and Staff Support Services** who is responsible for the supervision and evaluation of child study, special education and guidance health/physical education, school nursing, director of curriculum and bilingual personnel in order to provide social and emotional support services to students that will enable them to maximize their academic talents.
- **Director of Transportation** who is responsible for all aspects of providing transportation

News

November 18, 2005
Value-Added presentation put online
Go to:
www.wpsweb.com/administration/supt/valueadded

Ongoing
Stained glass window by Sandra Hersh
Memorializes those who suffered during the time of the Holocaust
Congregation Beth Israel on Jamesbury Drive in Worcester

Figure 4-9 This is the only section that has some consistency in that it is very similar in look and operation to the Administration page.


WPS - Schools Directory - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.wpsweb.com/Schools.HTM
Go
Getting Started Latest Headlines Technology Solutions
Worces... Worces... Worces... Adult E... Athletics Worces... Federal... WPS Pa... Worces... WPS - ... Tech In... Worces...
HOME | ADMINISTRATION | SCHOOLS | CURRICULUM | FEDERAL | ATHLETICS | ADULT EDUCATION | PIC
SEARCH
go
Transferring data from www.wpsweb.com...
Page 9 / 9 Default 100% INSRT STD HYP *

Worcester Public Schools

Schools Directory

Follow the Links to the right to get to a School or Quadrant Home-Page.

■ NORTH QUADRANT

North High
Worcester East Middle
Belmont St.
City View
Grafton St.
Lake View
Multiple Intelligences
Rice Square
Roosevelt
Union Hill

■ SOUTH QUADRANT

South High
Sullivan Middle
A.L.L. School
Canterbury St.
Columbus Park
Comp. Skills
Gates Lane
Goddard
Heard St.
New Ludlow
Quinsigamond
University Park
Vernon Hill
Worcester Alternative

■ BURNCOAT QUADRANT

Burncoat Senior
Burncoat Middle
Burncoat St. Prep
Clark St
Harlow St.
Lincoln St.
McGrath
Norrback Ave.
Thorndyke Rd.
Wawecus Rd.
Worcester Arts.

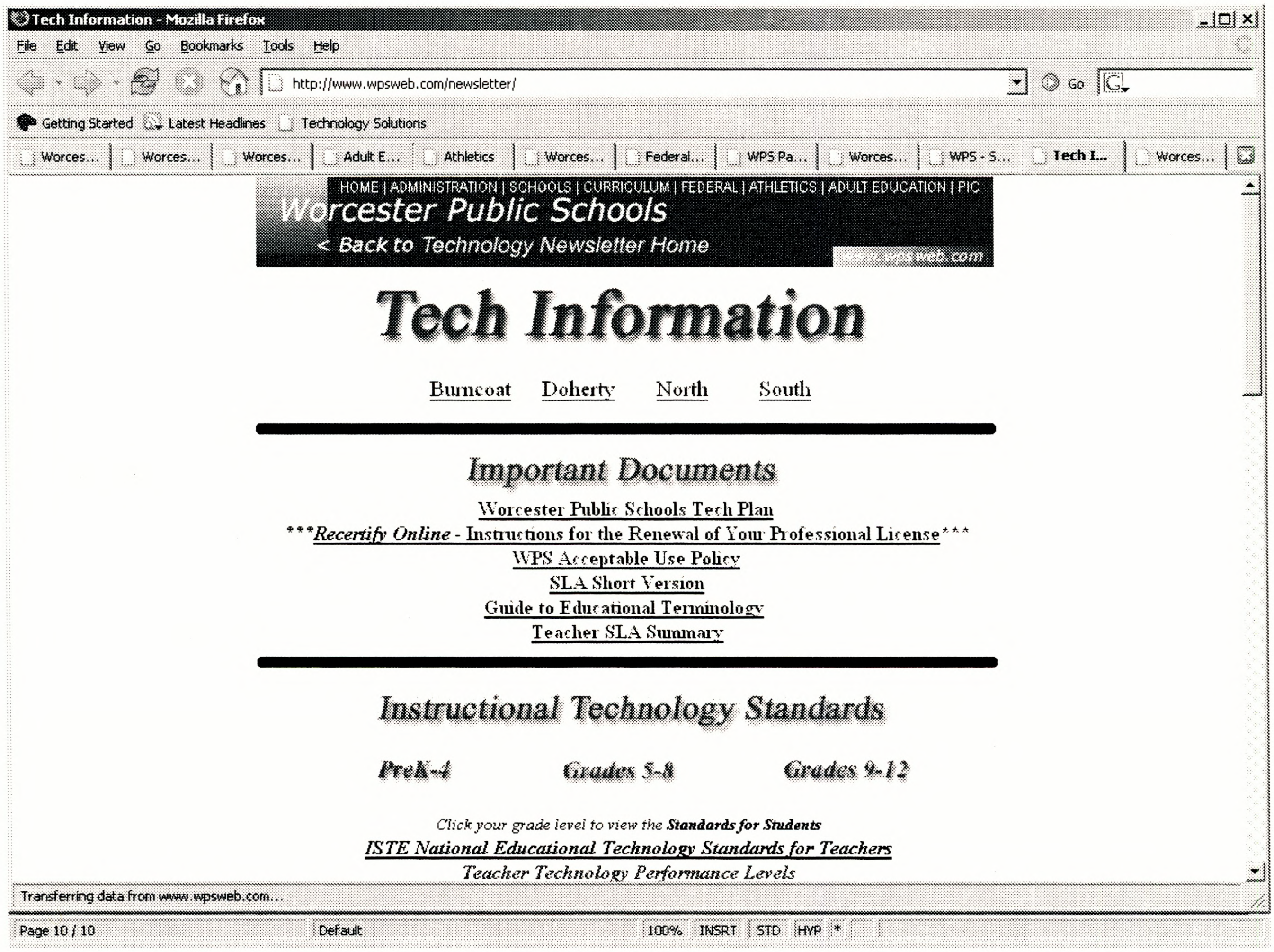
■ DOHERTY QUADRANT

Doherty High
Forest Grove Middle
Chandler Magnet
Chandler St
Elm Park
Flagg St
Jacob Hiatt Magnet
May St.
Midland St.
Mill Swan
Nelson Place
Tatnuck Magnet
West Tatnuck

■ Worcester Vocational School Web Page

☐ Use Free-Text Query

Figure 4-10 This list of schools is very hard to follow, since very few people that do not work for the school system actually know the quadrant system, and once again offers a different look from the rest of the site.


Tech Information - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://www.wpsweb.com/newsletter/
Go
Getting Started Latest Headlines Technology Solutions
Worces... Worces... Worces... Adult E... Athletics Worces... Federal... WPS Pa... Worces... WPS - S... Tech I... Worces...
Transferring data from www.wpsweb.com...
Page 10 / 10 Default 100% INSRT STD HYP *

HOME | ADMINISTRATION | SCHOOLS | CURRICULUM | FEDERAL | ATHLETICS | ADULT EDUCATION | PIC

Worcester Public Schools

< Back to Technology Newsletter Home

www.wpsweb.com

Tech Information

Burncoat Doherty North South

Important Documents

Worcester Public Schools Tech Plan
Recertify Online - Instructions for the Renewal of Your Professional License
WPS Acceptable Use Policy
SLA Short Version
Guide to Educational Terminology
Teacher SLA Summary

Instructional Technology Standards

PreK-4 Grades 5-8 Grades 9-12

Click your grade level to view the **Standards for Students**
ISTE National Educational Technology Standards for Teachers
Teacher Technology Performance Levels

Figure 4-11 The tech info page has everything centered, which is something no other section of the site has. With the exception of the color scheme it is also completely dissimilar to all other sections of the site.

The second issue discussed pertained to the procedure required to post updates to the website. Their current system for updating the site, as described to us during the meetings, is that the web master for each individual school uses Microsoft Front Page (or straight HTML coding in Notepad and the like) to create the new page, or to modify an existing page, and then place the new page in the offline version of the website that is updated every Friday. The principal is supposed to respond to the Webmaster if they find that the update is not suitable for posting. Because the principal is usually swamped with work and the system in place to check changes is not very good, they do not always respond or even pay attention to the website, possibly because there is no system in place to inform the principle if a change has been made and, if so, where the change is. It would be a very labor intensive task to look though all the pages every week and look at all of the content to see if it is correct/appropriate. Because of this, no response is viewed as a yes response and the website is updated regardless of whether the changes are correct or not. This can obviously cause problems on two fronts: the principal may not be able to stop something from getting posted if they do not respond quickly enough, and also the Webmaster has a chance of coding up some errors in his HTML code. So our first task for the new websites design was to develop a way to make updating easy for the Webmasters, validation of the updates easy for the principals, and maintenance easy for the people working on maintaining the website.

The Original Proposed Solution

The plan that we developed was rather simple. We would have the entire website's content stored in a large SQL database, and the HTML for each page would be automatically generated whenever the web server received a query for a page. Automatically generating the HTML at run-time gives us the benefit of never having to hire people to go through each page on the website and edit the HTML of the menus system. The menus system can be stored in either an HTML template or another, smaller SQL database for easy access. The second method, with the menus stored in databases, seemed a little better because they can be easily updated without knowledge of HTML or web programming. Also, with every content-related piece of data stored in a database, the only HTML that needs to be stored is the graphical layout of the website, whatever that may be. The code for both the menus and the content can then be automatically inserted into the HTML layout template at runtime, making every aspect of the website, including content, navigation, and the 'look-and-feel', easy to maintain because it is all stored in only one place.

We also discussed the new procedure for editing the webpage and adding new content. The system that we created would have a web login page where anyone who has permission to post updates to content and to create more content can log into the system and edit content. They will be able to edit content entries in the database and also create new entries as long as that person has permission to access that section of the website. For instance, if someone from high school A wants to edit the newsletter for their school, they can do that with no trouble at all. However, if that same person wants to edit the lunch menus for middle school B, he cannot because the permissions system will not give him write access to other schools' content. He can, however, read data from other schools' entries, and use content from another school to help create his own school's content. Once the person conducting the updates has completed his updates, he submits the changes. The changes and the request for the changes goes to whomever is in charge of that portion of the website, be it a principal in a school or someone in the District Administration Building. The person in charge will receive an e-mail informing them of the changes requested. The e-mail will also contain two hyper links to the content server: one to reject the changes and one to accept them. Based upon which link the person in charge clicks on, the server will either discard or upload the changes to the externally visible portion of the website. We believe that this method of conducting modifications to the content is superior to the old one because the content is easier to update, i.e., the person making the updates doesn't need to know any web programming, and the work for the person in charge of verifying the updates is greatly reduced; they only have to click on a single link to either reject or accept a request, and the system handles all the details internally.

The structure of the user system is that every person that has access to edit the website will have a unique username and will belong to one group. It is possible to create a user who has no rights to edit anything, but there is no reason to create an account for any reason other then editing. Our original thought was to just have users and assign a list of users to every page on the site; the users on that list would be the ones that were able to edit it. It seemed like it would be the easiest design to implement, but after we got a better understanding of how many pages were on the site and how many people would need to have accounts, it became clear that while it would be the easiest to program, it would be very hard to set up initially and making changes to the permissions in the future would be very difficult. As a result we made the decision to go with a more robust approach of using groups as well as users, so it would be structured similarly to how permissions are set up in a Windows or Unix system. We made the decision to go with only one group per user for two main reasons: it would be easier to implement and we didn't feel that there would be a lot of need for individuals to belong to multiple groups. The only time that it would really come in handy to have someone in two groups would be if you wanted to have someone have the ability to edit something in two separate nodes of the tree structure the menu is based in. From what we understood about how the website is managed, that would not really be necessary. For example if you wanted someone to have only the rights to edit elementary school A and middle school B, that would require 2 groups, but currently there is nobody in the Worcester Public Schools that would require those rights. If in the future someone did need such permissions, an easy work around to the problem would be to simply create two user account for that person, with each account being for a different school.

New Website Navigation System

The next big issue discussed was what kind of menus the new website will have. We needed to decide on whether to have basic test menus that one clicks through to bring one through the website's hierarchy, or if we will have some type of active-menu where one can get to almost any page of content on the site without having to navigate through the site's whole hierarchy. The project sponsors leaned towards a type of active-menu because they thought that in this day and age, we should have a streamlined website where the entire website is accessible from the homepage. Their reasoning for this was that people would be more likely to browse the web page if they don't have to sit through dozens of pages of sub-menus just to get to where they want to get. If they can get there in one or two clicks, instead of 10, they will be far happier with the site. With that issue resolved, we then needed to decide what type of active-menu system would best suit the needs of the new website. We came up with two different possibilities for active-menus, and we developed small prototypes of both so that during a meeting we could make our final decision a well-informed one by weighing the pros and cons of each. Of course, the best way to evaluate the pros and cons of a system is to actually take it out for a test drive.

The first potential menu system developed was the widely used drop-down menu system, where the mouse cursor hovers over a small area on the screen and a table of menu links appears under the cursor. When the mouse cursor is pulled away from the table of links that appeared, the table of links neatly hides itself so that it doesn't obscure the content of the page. Menu systems such as this are easily created using JavaScript code embedded into the HTML of the web pages. To prototype this system, we used an online tutorial to aid with the semantics of creating such a system. The JavaScript that controls the content of the menu look like this:

```
//main
myTest = new menuBar('myTest',780, 'horizontal', border, border );
myTest.addLabel('labelBullet', 'Central Office', 1, 60, offColor,
onColor, '#', 'left');
myTest.addLabel('labelBullet', 'Our Schools', 2, 70, offColor, onColor,
'#', 'left');
myTest.addLabel('labelBullet', 'Our City', 3, 50, offColor, onColor,
'#', 'left');
myTest.addLabel('labelBullet', 'Maps & Directions', 4, 80, offColor,
onColor, '#', 'left');
myTest.addLabel('labelBullet', 'District Resources', 5, 80, offColor,
onColor, '#', 'left');
myTest.addLabel('labelBullet', 'Academic Resources', 6, 80, offColor,
onColor, '#', 'left');
myTest.addLabel('labelBullet', 'Human Resources', 7, 80, offColor,
onColor, '#', 'left');
myTest.addLabel('labelBullet', 'Family Resources', 8, 80, offColor,
onColor, '#', 'left');
myTest.addLabel('labelBullet', 'Teacher Resources', 9, 80, offColor,
onColor, '#', 'left');
myTest.addLabel('labelBullet', 'Tech Resources', 10, 80, offColor,
onColor, '#', 'left');
myTest.height = 14;

//central office
menus[1] = new menu(150, 'vertical', border, border );
menus[1].height = 16;
menus[1].addItem('menuItemBullet', 'Superintendent\'s Goals', null,
150, offColor, onColor, '#', 'left');
menus[1].addItem('menuItemBullet', 'School Comittee', null, 150,
offColor, onColor, '#', 'left');
menus[1].addItem('menuItemBullet', 'Calendars & News', null, 150,
offColor, onColor, '#', 'left');
menus[1].addItem('menuItemBullet', 'Forms & Documents', null, 150,
offColor, onColor, '#', 'left');
menus[1].addItem('menuItemBullet', 'School Cancellations', null, 150,
offColor, onColor, '#', 'left');
menus[1].addItem('menuItemBullet', 'Dept. of Education<br>District
Profiles', null, 150, offColor, onColor, '#', 'left');
menus[1].addItem('menuItemBullet', 'MCAS & MEPA Schedule', null, 150,
offColor, onColor, '#', 'left');
menus[1].writeMenu();
```

Figure 6-1 JavaScript Sample

The parameters for the menu() function in the above code are: the width of the menu, whether the menu is vertical or horizontal, and color information for the two types of borders. The parameters for the addItem() function in the above code are: the type of menu item, the name of the menu item, a number to specify sub-menus for this item, or null if there are none, the width of the menu, in pixels, the normal menu color, the mouse-hover menu color, the url this menu links to, and the left or right alignment of this menu item.

It was not very difficult to edit this code manually, so if need be, it would be possible to make all future changes to the menu by manual editing.

We inserted the website's hierarchy into the system to see how it would look on a real webpage. The system worked nicely on the sample web pages that we invented, the main set of menu links could be hovered over and expanded into the tables of links, some of which also had sub-menus attached to them. When the mouse hovered over the links with sub-menus, the sub menus expanded outwards to the left or the right depending on how much space was left on the screen. The system supported a potentially infinite number of sub-menus that could keep cascading outwards, but we had decided ahead of time that any more than two or three levels overall would be more obtrusive to the layout of the webpage and too cluttered to put into the final version. Another potentially useful feature that the drop down menu system supported was the fact that any item in the menu hierarchy could be used as a link to somewhere else, be it a root menu item, sub-menu item without any more sub levels, or even a submenu item with more sub levels. This allows the flexibility to add a text-only navigation interface to the website that can very easily interface with the active-menu.

The second menu system developed was an expandable menu system. This expandable menu had the main categories on the top of the screen going horizontally. When one clicked on one of those it opened the list of subcategories vertically on the left side of the screen. It was noted with a graphic which of those subcategories was further expandable to make it easier for the user to navigate. If the category were not expandable when you clicked on it, then it would open that page to the left of the vertical menu and below the horizontal one. If the category was further expandable, then when one clicked on it, its subcategories would open below it indented to the right. When one clicked on a category outside of that submenu it would close the submenu currently being viewing and open the new one. This is similar to the way that Microsoft Windows Explorer works except you are not able to keep multiple sections of the tree expanded at once. While navigating the menu, the page you were on would stay the same until you clicked something that was not expandable.

In the end, we decided to go with the drop-down menu system instead of the expandable menu system. One of the biggest reasons for this decision was the fact that a drop-down menu system is more what the general population is used to. The majority of the population use computers running Windows, and in many of the applications that people use on Windows machines, such as Word, Excel, and Internet Explorer, the menus that control how the program runs are of the drop-down variety. We decided to keep our website somewhat consistent with the programs people normally use in everyday activities. Doing so would make the general populace more comfortable with using our menu system, and therefore increase the appeal of such a system. Another reason for the choice we made is that the drop down menus gave the website a more compact, sleeker look. The drop down menu took up very little real estate on the screen when the menus were retracted, so more of the web page could be filled with content, as opposed to the expandable menu system, which used a lot of space along the side of the screen to display the expanded menus. Some of the drawbacks of the drop down menu system were that the menu items themselves were pretty small, and someone with poor mouse control or a small screen may have trouble keeping the mouse cursor inside the menu items, causing the menus to keep retracting when the user is trying to navigate between them. This of course can be fixed by increasing the delay between when the user mouses out of the menu system and when the menu system actually disappears. However, we also cannot make this delay too large. This is because while the menus are out they take up a very large amount of screen area. If they remain usable too long after a user mouses out, then the end users may complain that they are sitting around waiting for the content to become visible again when they select a menu to visit. Probably the biggest disadvantage that the drop down menus had to the expandable ones was that when there was a large amount of sub-items inside a menu, the expandable menus allowed you to scroll the webpage to see them all. However, the drop down menus did not, and consequently, the system had to be modified to allow the sub-menus to be displayed in columns so that the screen could fit them all. This method worked, but there is still a limit to the number of sub-items you can have in a drop down menu, whereas the expandable menus had no limit. Despite the shortcomings of the drop down menu system, we still selected that system to be the one in the final website because its advantages over the expandable menus were, in our opinion, greater than its disadvantages.

We used some of the code from the expandable menu system to make the drop down menu load from an SQL database that had all of the menu names and their hierarchy in it. This way it is very easy to edit the menu. Originally the only way to make any changes to the menu was to actually manually edit the SQL database from the command line. But we managed to recycle some of the code from the expandable menu system to make an editor that allows someone who knows nothing about programming or

SQL to edit the menu easily. One problem during the initial implementation was that each submenu could only have 16 items. This would not have been a problem for anything in the menu except for the list of elementary schools. The system now supports about 50 items in each submenu, so the elementary schools should no longer be a problem. One "bug" that we originally had was that the JavaScript for the menus is generated every time a page is loaded. While it was not a very CPU intensive task, we were afraid that it could add up over time and with users and it could eventually cause a problem. We thus modified the system to generate a JavaScript file that was saved as a flat file and only overwritten when a change was made to the menu. This way, the JavaScript is not generated by the web server every time someone visits a page. The advantage to this is that we save CPU time on every visit to the site. If only one person visits the page, then this is not a hugely important savings. However, if many requests are coming into the server, then saving CPU time for each visit will add up to a very significant savings.

New Website Graphical Layout

The next issue that we focused on was the graphical layout of the website's pages. This was one of the smallest issues we have discussed because we weren't trying to plan out the colors to be used in the website, but rather the layout of what parts go where, and how big to make the menu bar and the title section. So the two main layout designs that we developed both were designed around the drop down menu system. The first of the designs had the title section on top taking up the whole width of the page, followed by our drop-down menu bar right underneath, also taking up the entire width of the page. The main content of the page was beneath that, also taking up about 75% of the page starting at the right side and in the other 25% was the second level menu. The second-level menu bar was used in this design because we had considered not wanting the drop-down menus to have more than 3 sub levels, even though some of the sections, such as the individual school pages, had an additional few more sub levels in the menu. So to solve address this problem, the sections of the website that need to have an additional menu system besides the main one had a second-level menu that was uniform only within that section of the website.

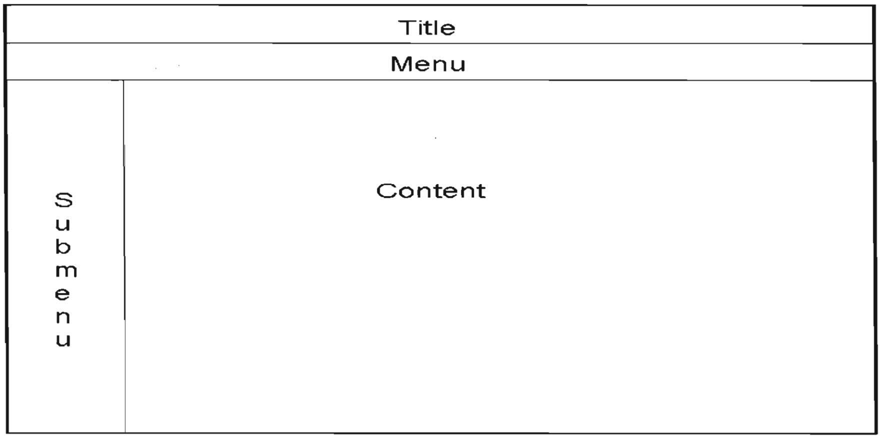


Figure 7-1 Layout Version 1

The other design that we developed was almost identical to the previously mentioned one, with one exception: the second-level menu was not included.

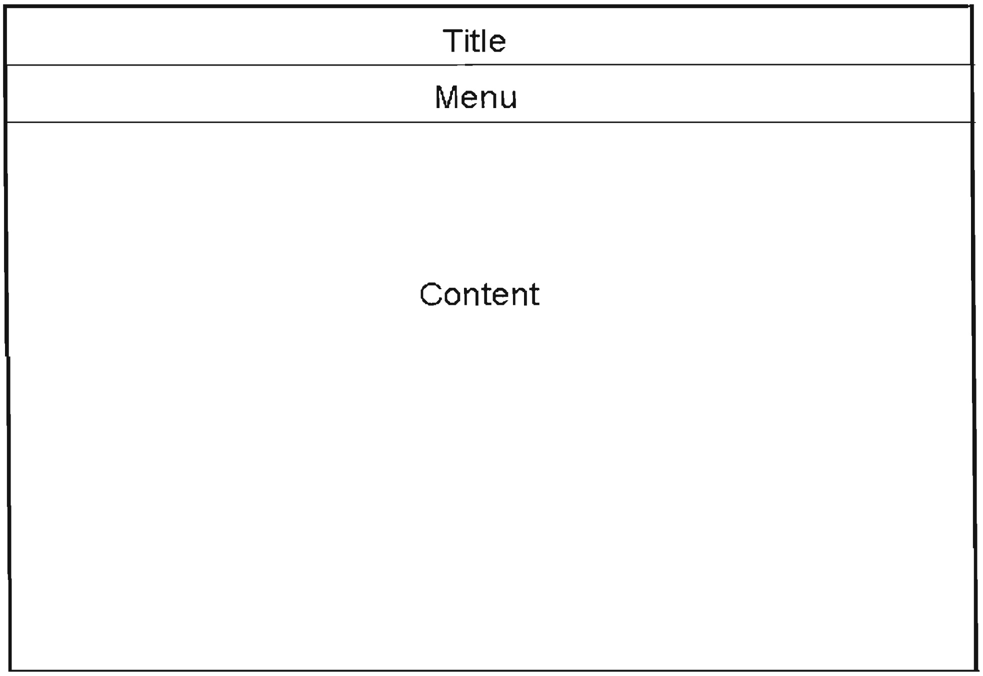


Figure 7-1 Layout Version 2

We ended up choosing the second layout for two main reasons. The first was that even though the second level menu added some ease of use it side took away space from the content area. The other reason was that we decided against using a second level menu mainly because we thought the ease of use it would add was not worth the added effort it would take to get it to function the way we wanted it too.

New Website Navigation Hierarchy

The last major issue that we investigated was the new website's hierarchy arrangement. The way we developed our new hierarchy was somewhat intriguing. We were given a packet of papers that had all of the menu items and sub-items on it. We used this sheet to generate a flow-chart of the website's hierarchy with the assistance of the software package *Visual Paradigm*. We then had a meeting that entirely focused on the hierarchy, where we talked about its quirks and its pros and cons in the current state. We made several changes, such as moving menu items between sub levels, and also promoting and demoting items to different tiers in the hierarchy. For instance, we had a short discussion on whether or not several items should be accessible from the root level, or if they weren't important enough to be seen until at least level two or three. Unfortunately, we weren't fully able to bring that discussion to a conclusion during that meeting, so we decided to use some other School Districts' website hierarchies as 'benchmarks' as we compared how many schools had similar menu hierarchies to ours. To do this, we were given a list of schools' websites that the Project Sponsors believed to be exemplary. One by one, we visited the school websites and, for every category in our menu hierarchy, we annotated which level in the menu tree that item appeared in our menu system, and which level the item appeared in that school website's menu hierarchy. We used the numeric data gathered from each website and compared the data to the numeric data from our menu hierarchy. As it turned out, the vast majority of other schools' websites, upwards of 80% for most menu items, had menu hierarchies arranged very similarly to our own layout. We took this as evidence that our layout and arrangement was good, if not perfect, because it was consistent with several good websites. It is still possible that the hierarchy we have will be confusing to some people, just because it is similar to other sites does not mean it is necessarily good. It may make perfect sense to someone who is an administrator in the school district, but be very confusing to a parent because they might not be aware that something should fall under a certain category. Although this seems like a substantial problem, it actually is not difficult to counter. The design plan that we have created was intended from the very beginning to be as flexible as possible. The advantage of having the menus and the website's content stored in an SQL database rather than dozens of HTML files is that the structure of the menu hierarchy can be drastically altered without very much work. Also, the design we have developed will support placing links to the same piece of information in multiple locations, should the need for that arise.

Development Process

Although the activities that we have pursued over two terms can easily be considered the development process for the new website, the true development process is really just the process of the development of the software that will control the editing, management, maintenance and user control system for the website. Heading into this phase of the project, we knew that developing this system would be challenging, and would definitely require a lot of work. Of course, we wanted to work on the development in an intelligent manner, so we decided to divide the software into three separate, easier-to-handle segments. Doing this is a common software engineering strategy, especially when you have two or more people working on the project. The three segments that we divided the software into prior to developing it were: the Menu Editing Subsystem, the Content Editing and Management Subsystem, and the User Management Subsystem. Our main development plan was to create the three subsystems separately from one another, and then when they are completed, integrate them into one entity.

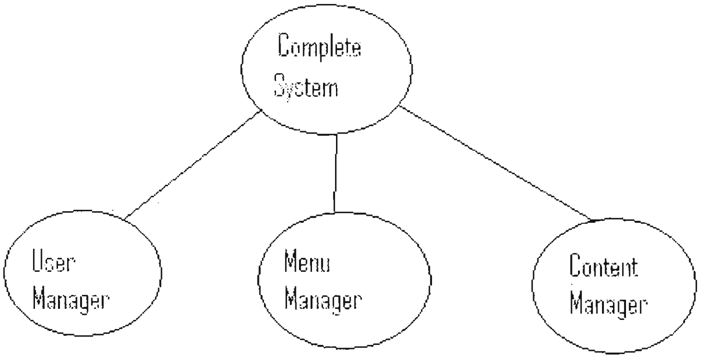


Figure 9-1 System Chart

The Content Editing and Managing Subsystem called for a web based html editor that would handle all of the changes in content. Our first plan was to design and build our own interface from scratch. It was going to have just the basic functionality such as the ability to center, bold, and underline text, and add images; more complicated things would require editing in html or using an external editor such as FrontPage for people who did not know HTML. We had tried to get away from external programs such as FrontPage, but thought at this point that it would not be avoidable completely. When we started the design process, it became clear that it would take far longer then we originally thought to build. Most of the components that we broke it down into would take a few days on their own to build. Our best estimate was that it would take a few weeks to get that system working if we did nothing else, and it would only have limited capacity, and that is assuming we did not run into any complications.

Once we came to the realization that it may not be the best idea to build our own editing system, we decided to explore the idea of using some open source web based editor that was already in existence. Using the theory that is was best to not try and reinvent the wheel, we started downloading and testing programs we found that looked even remotely promising. We found several that fulfilled some of out requirements, but had little luck in finding one that we thought would be sufficient for our needs.

- **http://www.webgrrls.com/tech/techtools/htmleditor.phtml**
- **http://www.unica.edu/uicfreesoft/**
- **http://fslactivities.sd61.bc.ca/ezHTMLarea/**
- **http://www.ektron.com/ewebeditproxml.aspx**

Table 9-1 List of editors tested

All of the packages we tested had major problems. Some turned out to be too buggy to use on a project such as this; others were not very user friendly. People who have lots of experience with systems such as this had trouble using them, and limited testing on people who were not as technically skilled showed that at least a minimal amount of training would be required for people to be able to use it. The other main issue we ran into was that some of the systems were not designed in a way that would interface well into our system. We were just about to give up on our quest to find an open source alternative and progress with coding it ourselves when we stumbled on HTMLArea (http://www.dynarch.com/projects/htmlarea/) almost by accident.

After testing it appeared that HTMLArea would support all of the functionality we needed, so it was the one we decided to go with. It turned out to be far better than what we originally hoped. There were far more features, most of which are found in Microsoft Word, in a similar setup (see help documentation for list of features). So it will help the learning curve since most people will be probably be a little familiar with the interface already.

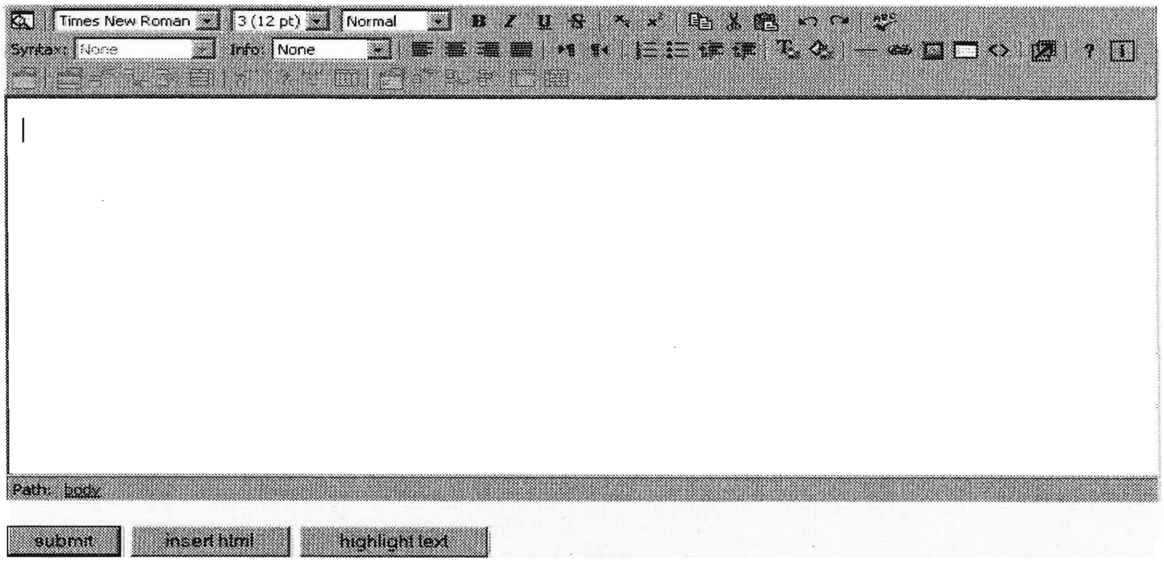


Figure 9-2 Screenshot of Editor

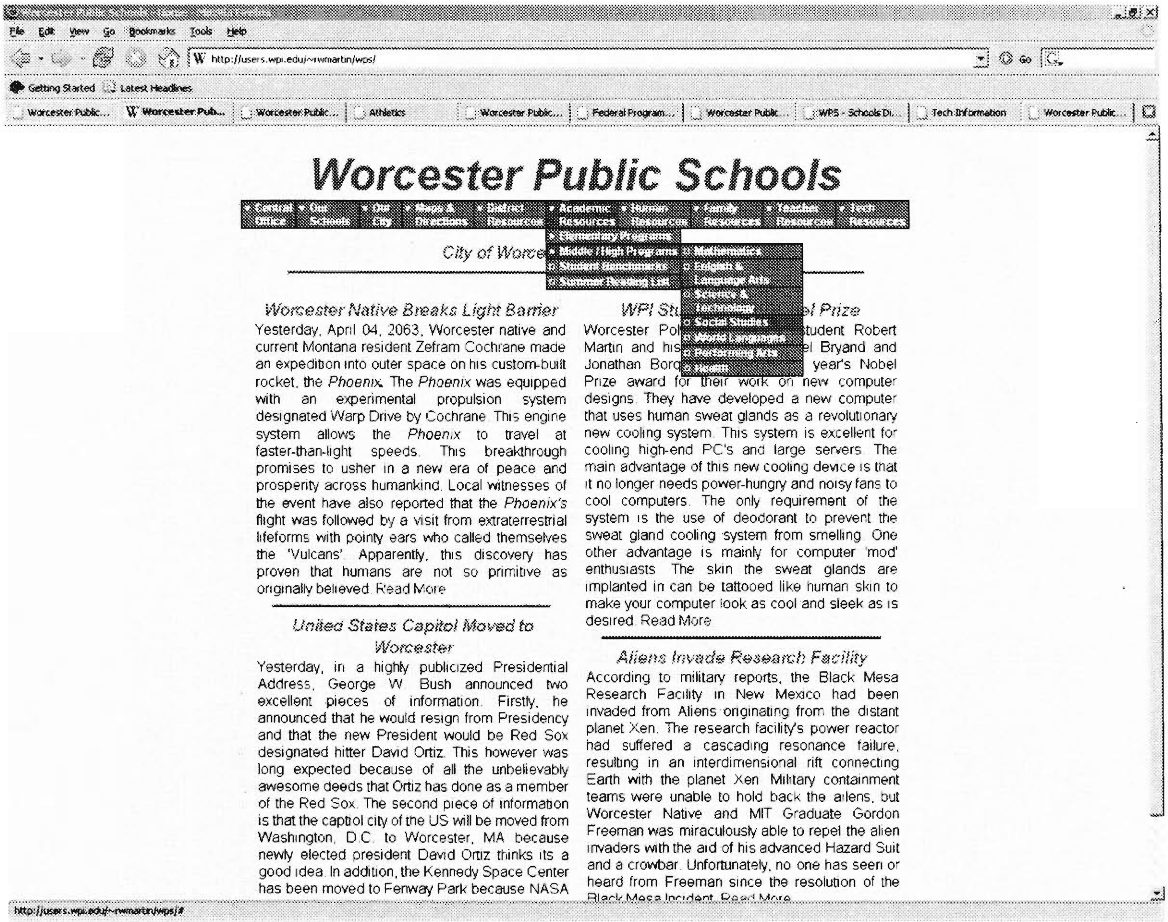
There was a spell checker included with the package that was one of the features we were asked to make sure was available due to the commonness of spelling mistakes; it would reflect poorly on the school district if their website had spelling errors in it.

The Menu Subsystem is probably the most important of the 3 major subsystems because everything depends on it. The system would still have some functionality without the User Subsystem or the Content Subsystem. Without the menus the system would not function at all. Not only is it the tool that allowed people to navigate the website, it serves as the backbone of the system. The content for the website is stored within its structure and it is what the User Subsystem gives access to for editing. For this very reason, we decided that the most development time should be spent on the Menu Subsystem. We wanted to plan out and develop the subsystem without making any design flaws or having any oversights because if the Menu Subsystem was flawed, the rest of the project would suffer. To tackle the development of this subsystem, we broke into several smaller parts.

The First step was to design the tree structure for our menu system, the "what goes where" of the website. We based it heavily on the structure in the preexisting website that we looked at earlier and the structure that is on the current Worcester public schools website. The final design was based a little more on the current structure of the website than on the structure of the ones we researched because it made little sense to change some of the things just because they were different on another website. We built our menu tree using the software package *Visual Paradigm* (http://www.visual-paradigm.com/). We decided to go the route of designing it in software instead of using paper and drawing out our own chart because it would be easier to keep it neat; in addition, we planned on making a lot of changes to it while we created it. This was not something that was intended to be correct on the very first try. The software turned out to be a great help in that area. The only drawback was the way they the menu turned in the software was perfectly easy to read on a computer screen but it did not easily translate to paper. Printed out in landscape mode, it was 15 pages long and only one page deep. Possibly another issue was the people may be less likely to suggest changes when they are looking at something in a semi-permanent format such as printed paper. We may have had less negative feedback using the computer program than if we drew it out by hand on paper. After a few revisions this is the final version we designed. The green boxes symbolize the pages we thought would probably need to be updated the most often. The blue boxes would probably only need to be updated once a year, if that. See **Appendix B-1.**

One of the major things that we contemplated at this point was whether or not we would allow one page to be accessible from two parts of the menu. For example something could be under administration and government programs if it logically made sense for it to be in both. There were a lot of pros and cons to this. The major advantage would be that it would make things easier to find, but it would also increase the number of things in the menu. Thus, it could actually make it more difficult to find things. It could also become an issue when something was changed to make sure it was changed in all views. That turned out to be something that could not happen with the way the menu was finally implemented, but at the time was a concern. As a result of the complications in trying to implement it and because it was not clear that it would be a significant feature, we decided to have each object appear in the menu only once. On the figure in **Appendix B-1** calendar does appear more than once. Those are actually different calendars of different things; they were just poorly named on the chart.

The other prototype that we created is what turned out to be the menu system we went with. It was JavaScript based, unlike the other prototype that was php/html based. Also unlike the first prototype, this was based off one of the menus on one of the sites recommended to us by our Project Sponsors; the main categories were at the top just like in the other prototype, but in this one when you moused over them they opened up the next level of the tree. The categories thus opened with a mouse over as opposed to a click. In order to load the page you still needed to click on that node in the tree.



Worcester Native Breaks Light Barrier

Yesterday, April 04, 2063, Worcester native and current Montana resident Zefram Cochrane made an expedition into outer space on his custom-built rocket, the *Phoenix*. The *Phoenix* was equipped with an experimental propulsion system designated Warp Drive by Cochrane. This engine system allows the *Phoenix* to travel at faster-than-light speeds. This breakthrough promises to usher in a new era of peace and prosperity across humankind. Local witnesses of the event have also reported that the *Phoenix's* flight was followed by a visit from extraterrestrial lifeforms with pointy ears who called themselves the 'Vulcans'. Apparently, this discovery has proven that humans are not so primitive as originally believed. Read More

United States Capitol Moved to Worcester

Yesterday, in a highly publicized Presidential Address, George W. Bush announced two excellent pieces of information. Firstly, he announced that he would resign from Presidency and that the new President would be Red Sox designated hitter David Ortiz. This however was long expected because of all the unbelievably awesome deeds that Ortiz has done as a member of the Red Sox. The second piece of information is that the captiol city of the US will be moved from Washington, D.C. to Worcester, MA because newly elected president David Ortiz thinks its a good idea. In addition, the Kennedy Space Center has been moved to Fenway Park because NASA

WPI St l Prize

Worcester Pol student Robert Martin and his el Bryand and Jonathan Borq year's Nobel Prize award for their work on new computer designs. They have developed a new computer that uses human sweat glands as a revolutionary new cooling system. This system is excellent for cooling high-end PC's and large servers. The main advantage of this new cooling device is that it no longer needs power-hungry and noisy fans to cool computers. The only requirement of the system is the use of deodorant to prevent the sweat gland cooling system from smelling. One other advantage is mainly for computer 'mod' enthusiasts. The skin the sweat glands are implanted in can be tattooed like human skin to make your computer look as cool and sleek as is desired. Read More

Aliens Invade Research Facility

According to military reports, the Black Mesa Research Facility in New Mexico had been invaded from Aliens originating from the distant planet Xen. The research facility's power reactor had suffered a cascading resonance failure, resulting in an interdimensional rift connecting Earth with the planet Xen. Military containment teams were unable to hold back the ailens, but Worcester Native and MIT Graduate Gordon Freeman was miraculously able to repel the alien invaders with the aid of his advanced Hazard Suit and a crowbar. Unfortunately, no one has seen or heard from Freeman since the resolution of the Black Mesa Incident. Read More

Figure 9-3 Menu Structure Screenshot

The decision to go with the second prototype was based on a large number of factors, the largest probably being that it was similar to what a lot of the other school websites recommended to us by our Project Sponsors had on their sites. Another reason was that it was thought that the type of drop down menu system that the second prototype used would be easier for people to use. We did some research at that point to see what we could find in the way of studies that either proved or disproved that thought. What we found was a bit hard to analyze. This is because the first type of menu system that we created is normally used inside of a software application, rather than on a website. What people expect from something in those two situations are different. For example, in a software application, when you click on something you expect an almost instant response, but with a website you are willing to wait a little longer. We did find a lot of information about the drop down menu style system from prototype two. The amount of time that it takes the menu to close after the mouse cursor is no longer on it is rather important because it can become very annoying to a user. If they spend time navigating down the menu 4 or 5 levels and then accidentally move the mouse too much and have all of the menus close and need to restart, then they can become annoyed rather quickly. This is especially an issue with elderly people because they usually do not have as good an ability to control the mouse. Another issue was that it could tend to get too confusing as to exactly where you are in the tree once you navigate a few layers deep.

The third and final part of our website editing system is the User Management Subsystem. The main responsibilities for this subsystem are to provide an easy-to-use interface for system administrators to add, remove and change both user groups and individual users. Also, another use for this sub-system is for users with lower privileges to be able to change their own user account such as change their password. The advantage of this functionality is that they can complete the changes to their account whenever they want to, rather than having to wait for a potentially very busy system administrator to get around to it. The motivation for the system administrators' ability to change both the group hierarchy and the users within each group is this website will be constantly added to and maintained by a set of people employed by the Worcester Public School District. In any environment with employers and employees, there exists the probable situation that new people are hired and some employees are fired, as well as some employees are relocated to different parts of the project. In this case the system administrators need to be able to alter the user groups and the user accounts contained within them. One other piece of functionality that the User Management Subsystem contains is the ability for each subgroup owner to modify any of the user accounts within the group that he or she owns. The motivation for this is similar to the motivation for giving the system administrators complete control, and is that the owner of a subgroup, like a principal of a school, should be able to hire and fire and relocate the people working under them on their subsection of the website. In this case, it may not be necessary for the system administrators to even know what a school principal does to their user group, because an administrator most likely does not care who exactly is doing the editing of the website. However, the functionality still exists for the system administrators to change any group they want, because it is very possible that a subgroup owner could forget their password, and then the system administrator can go in and change the group so that the password for the owner is reset.

How exactly is this User Management Subsystem designed, and how was it developed? The user accounts in this system are structured into a group-oriented hierarchy. Each user is a member of exactly one user group, and each user group has exactly one "parent group", which forms the hierarchy. The root level "Administrators Group" is the only group without any parents, as it is the highest-level group in the system. It is similar to the administrator group in Windows or the root group in Unix based systems. It has access permissions to all of the other groups, and the lower-level groups have access to only themselves and to their "child" groups. What that means is that if you have, for example, a group called A and a group called B, and group B is a child of group A, then all the users that are members of group A will have access to everything that group A has access to as well as having access to everything that people in group B have. In short, the people in A have rights to A and B. The users who are in group B will only have access to the information that is associated with group B, they will not have access to anything associated with only group A. If you have third group, C, that has no parents and no children, then it has access to only the things that are in group C, very similar to group B except group C has no parent. The point is that a group does not care about its parents, only its children. So if group D is a child of group B then B will have access to B and D and group A will have access to A, B and D.

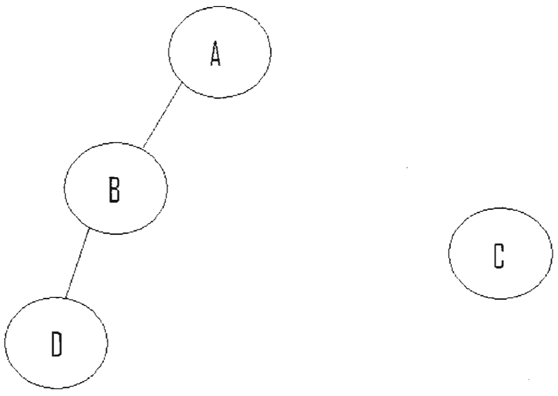
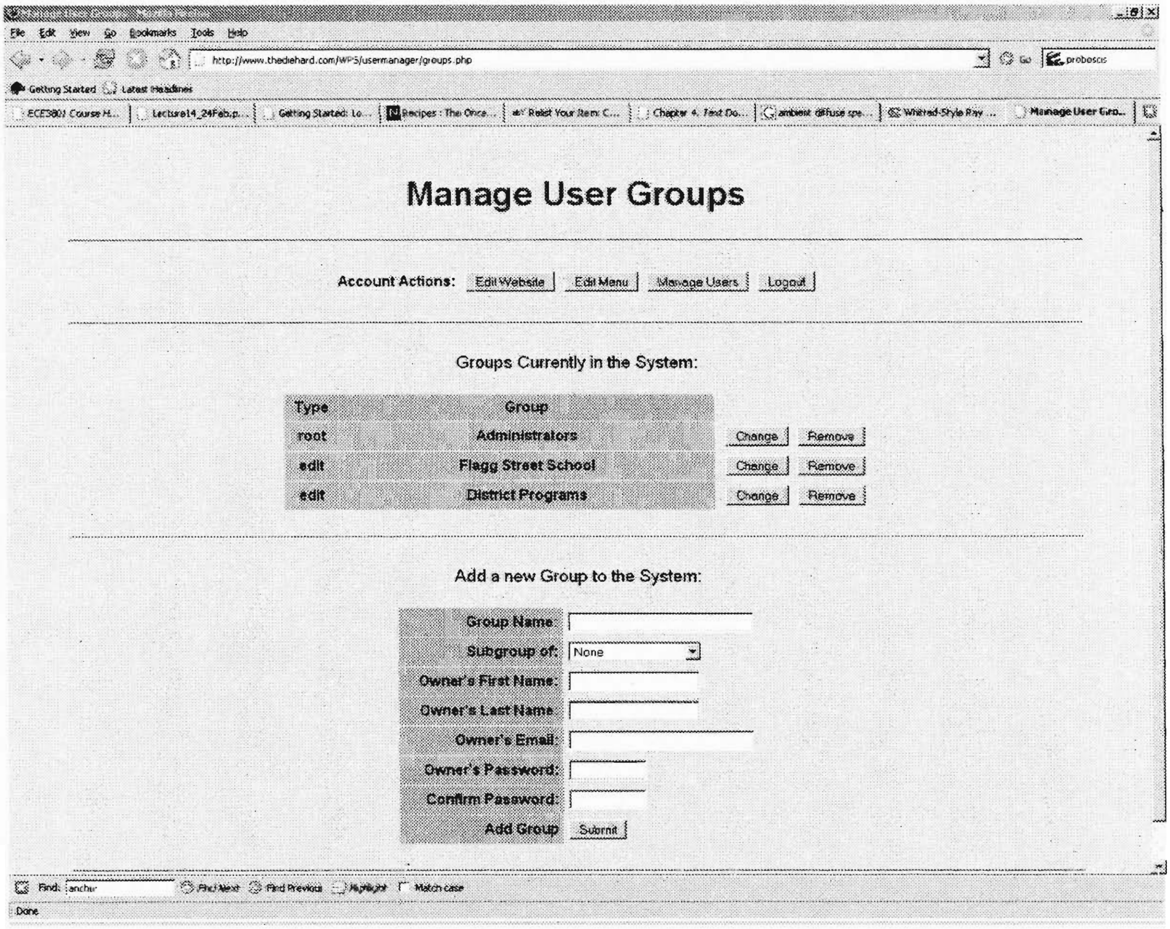


Figure 9-4 Group Example

All of the user accounts and the group information are stored in a MySQL database. A user account is stored in the database along with the following information about the individual user: their first name, last name, account type, email address, password, unique identification number, and the identification number of the group that the individual user belongs to. Each group is stored in the database as well, along with the following information: the group's name, group type, unique identification number and the identification number of the group's parent group, except for the case of the Administrators group, which has no parent group. Storing the user and user group information in a MySQL database makes the most sense because MySQL provides a rich and powerful feature set that allows easy manipulation of the database from within a web application. Also, the use of MySQL in this application offers one additional benefit. Should the server that this system is running on ever crash, MySQL will be able to prevent the user account data from being corrupted. This is one security and stability measure that would have been very difficult to ensure had we designed the database software ourselves. Also the SQL statements that are used in this design should work on most systems that are SQL based, such as MySQL or Oracle. We have not done any tests of the code on these systems and do not recommend that the system be moved over to one of these databases, but there is a very good chance that it would work correctly if the need arises for it to be moved in the future.

Like the other two sub-systems for this project, the User Management Subsystem was developed using the web programming language PHP. The User Management Subsystem was even further broken down to simplify the design process. It was divided into several PHP pages, each of which handles a smaller task. The first PHP page was responsible for providing an interface for the user to add or remove user groups from the system. The interface was designed to be minimal and also to be easy to use. At the top of the interface is a table that displays each group currently in the system. Next to each group's name is a pair of buttons for controlling that user group. One button will remove the group from the system, while the other will redirect you to another PHP page responsible for altering that group. Below the table of user groups is an HTML form that contains places to specify all of the required information for creating a group. Any information that is too large, a 100 character password for example will be truncated to fit the database, the only time this could become a problem is if someone has a email larger then 255 characters which is very unlikely.



Manage User Groups

Account Actions: Edit Website | Edit Menu | Manage Users | Logout

Groups Currently in the System:

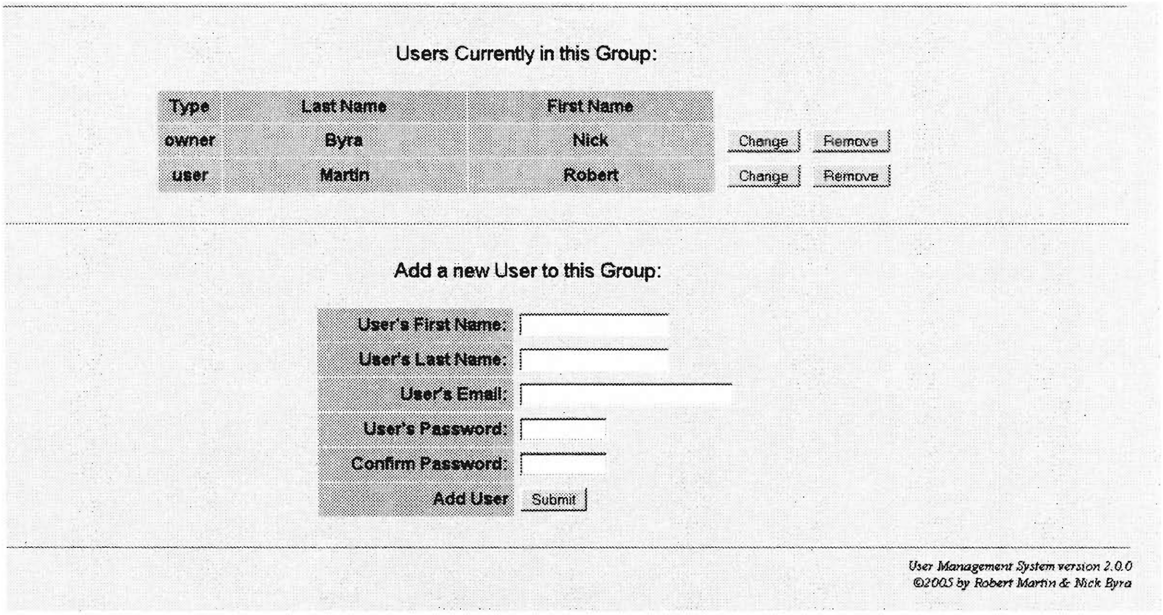
Type	Group		
root	Administrators	Change	Remove
edit	Flagg Street School	Change	Remove
edit	District Programs	Change	Remove

Add a new Group to the System:

Group Name:	
Subgroup of:	None
Owner's First Name:	
Owner's Last Name:	
Owner's Email:	
Owner's Password:	
Confirm Password:	
Add Group	Submit

Figure 9-5 Manage Groups Screenshot

The second of the PHP pages is responsible for modifying the list of users within a group. This page is structured similarly to the first one, with a table in the upper portion of the page for viewing the list of users currently in the group. Next to each user's name in the table there are two buttons, as with the table of groups. One button is for removing an individual user from the group, and the other is for changing the account information for that particular user. Below the table of users is an HTML form similar to the one used to add a group to the system. This form, however, is used to add a new user to the group. It contains fields for all of the information needed to specify a new user.



Users Currently in this Group:

Type	Last Name	First Name		
owner	Byra	Nick	Change	Remove
user	Martin	Robert	Change	Remove

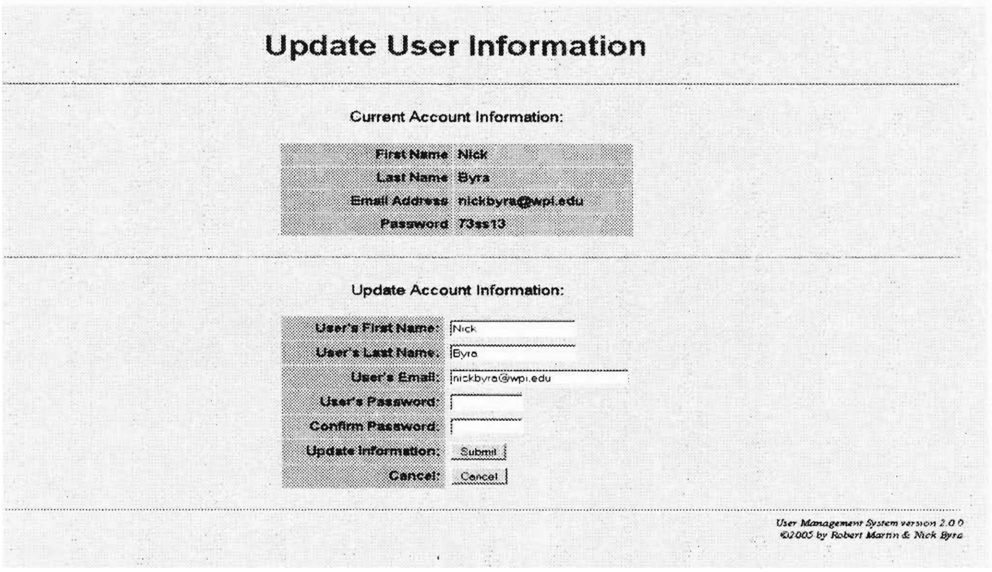
Add a new User to this Group:

User's First Name:
User's Last Name:
User's Email:
User's Password:
Confirm Password:
Add User

User Management System version 2.0.0
©2005 by Robert Martin & Nick Byra

Figure 9-6 Create User Screenshot

The third and final PHP page for the User Management Subsystem is solely responsible for updating a particular user's information. This page is less complex than the other two, and only displays two pieces of information: the current account data for the user we're trying to modify, and an HTML form for the new information to be entered.



Update User Information

Current Account Information:

First Name	Nick
Last Name	Byra
Email Address	nickbyra@wpi.edu
Password	73ss13

Update Account Information:

User's First Name:	Nick
User's Last Name:	Byra
User's Email:	nickbyra@wpi.edu
User's Password:	
Confirm Password:	
Update Information:	Submit
Cancel:	Cancel

User Management System version 2.0.0
©2005 by Robert Martin & Nick Byra

Figure 9-7 Modify User Data Screenshot

The method of breaking down the User Management Subsystem into the aforementioned pages makes a lot of sense from a design standpoint. Each successive page deals with a smaller subset of the functionality than the previous page. This breakdown follows the hierarchical design of the user and groups system of permissions. For instance, the system is composed of groups, and the first page deals with the creation, removal, and alteration of those groups. Each group contains user accounts, and the second page handles the creation, removal, and alteration of those very users. Each user account contains pieces of information, and the third page is responsible for altering such pieces of data, because at this level, no more data can be removed or added to the hierarchy.

The software engineering strategy of breaking down a large problem into several smaller ones to be solved individually and re-integrated at the end has its pros and cons. The biggest advantage of approaching a big problem in this manner is that each sub-problem is much easier to tackle. This gives us the added bonus of not having to fully plan out the entire system before we begin developing it. We simply have to define ahead of time how the different parts will "talk" to one another, and how they will integrate as part of a bigger system. Once this protocol is defined, then the individual subproblems can be designed and developed in any manner that makes sense to the particular programmer who tackles the problem. When a programmer can focus his thoughts onto one small domain, then he or she can more efficiently design that segment of code. The only work that needs to be done between programmers is the integration of all of the subsystems into one large system.

Unfortunately, even with well-planned subsystems and a well-defined method for the sub-components to integrate, there always seem to be glitches that sneak up on the programmers when they try to integrate all of the components of any large program. One such problem that we ran into when we tried to integrate the program's components was that our separate subprograms used different methods to validate whether or not a user was properly logged into the system. The code for the menu that checked to see if you had the right access to do what you were attempting used a cookie-based system to determine if a user who requested a certain page actually had the permissions to access it. The code for the Users Management Subsystem, on the other hand, used the POST variable method in the html forms to determine if a user actually was who they said they were. This was mainly a result of poor planning in terms of how login data would be stored, so it was implemented in two different ways in the system that were not compatible when it came time to integrate. This was obviously a problem because when a user tried to go from the user management system that had the one and only login prompt to any other part of the system you would be viewed as someone that was not logged in and as a result have no permissions to do anything. It was for this reason that for a long time during the testing phases we had permission checking turned off. We did have to eventually decide what code to change and to go with either the cookie or post system. We made the decision to go with the cookie system because it seemed to be superior in every way we looked at it. It was much more secure because it would be passing around your login info in plain text from page to page, unless we made the server https, which we had not planned to do. Also with the cookie system we did not have any problems with refreshing the page which seem to be an issue with the post method that was implemented on the User Management Subsystem. The third thing was there was no easy way to have the user login timeout using the POST system. Someone could log back into the system days later by using the back button on their web browser, assuming it resent POST data, something that most web browsers these days do. So the decision was made to set up the User Management Subsystem to use cookies. This turned out to not be an exceedingly difficult task, as it did not end up requiring a significant rewrite in the way anything worked on a fundamental level. What needed to be changed was mainly simple sections of code that dealt with where the data was coming from.

There were no other problems besides the one above that we ran into during the integrating process, other than the fact that the look and feel of the two user interfaces when originally integrated were slightly different. This was mainly a result of the fact that at that stage, no thought at all had been put into how the interface for the menu editing subsystem and the Content Editing Subsystems would look. All the work had been put into the functionality. This was a purely aesthetic problem that we eventually solved simply by porting over the style sheets and header functions from the User Management Subsystem to the Menu and Content Editing Subsystems. This gave them a very similar looking appearance and made us decide to use that basic template for all remaining additions to the administrative pages of the site.

Pre and Post-Development Comparison

Over the course of the development of this system, there were several design changes that we were forced to make. One such design alteration was how the permissions for the website worked. In the original design for the permissions system, we had planned for individual users to be able to be a part of one or more groups. However, in the current implementation of the system, each user is a member of exactly one group. There are several reasons for this decision to alter the design. First of all, in the hierarchy of the Worcester Public Schools' Website, each school or department has its own person in change of ratifying the updates and their own person or group of people in charge of actually making the updates to the webpage. The organization of the employees working on this website is such that there won't be a situation where one person needs to be in more than one group. Because implementing the ability for user accounts to belong to more than one group was substantially more difficult than simply limiting each user to exactly one group, we decided to drop this functionality. Our logic was that we should concern ourselves with getting the system operational by incorporating all of the features that we needed before we started adding features that were not essential.

Another feature that was discussed earlier in this paper was the potential for the system to support text-only menus and navigation for this website in addition to the JavaScript drop-down menu system that we had designed. However, in the current version of the software this text-only menu is not yet supported. There are several reasons why we chose not to go ahead and develop this feature into our system. First of all, when we originally proposed the idea of text-only menus to supplement the JavaScript menus, our project sponsors at the District Administration Building didn't seem overly enthusiastic about that feature. Because the feature was not necessary to the completion of the project and also the sponsors of the project did not really want the feature, we cut it from the design plans. If the need ever arose to have the text based menu system, it can easily be supported in the code that we have with the addition of one more function, which is simply incorporating hyperlinks into the dropdown menu items that are not leaf nodes. The most difficult task would be finding a way to make it visually appealing.

One feature that we added to the system's functionality since the original design stages involves our system for having the owner of a small subsection of the website accepting or declining the changes to a page. Originally, the subsection owner would be able to simply accept the changes to a part of the website, or be able to simply reject those changes. Now, this system requires that the subsection owner provide a reason why the changes were rejected. They can still just simply accept the changes, which will promote the new page to the external end-user viewable section of the website. The owners can no longer just reject the change. In the original version when changes where rejected they would be discarded from the database. The new way the rejection is handled does not completely delete the changes that were made. When the owner chooses reject, they are prompted to give a short explanation as to why the changes were rejected. Probably along the lines of "I like your changes to the website, but they need a few tweaks before I can show this to the outside world. Consider rephrasing the second paragraph and fix that spelling error." This feature becomes useful when someone makes changes to the website, but makes a typing mistake, or says that a certain school event takes place on the wrong date. In this case, the subset owner does not want to reject and discard these changes, but instead just hold off on accepting them until the fixes are made. The changes are sent back in an email to the person that made them along with the reason for rejection so they will be able to go back and reedit their changes.

System Limitations

Our Website Management System, although useful and powerful, has some limitations. The most apparent limitation that our system has will be apparent to both the Worcester Public School District Employees that will maintain the site, as well as the end-users who visit the website from their home computers. The limitation is in the length of the menus in the menu system. Both the menu system and the Website Management System are designed to support menus of any size, but the problem does not lie with the system we have developed in this case. When we were designing the menu system, we were told by our project sponsors at the District Administration Building that we needed to have our menu system work on a minimum screen resolution of 800x600 pixels because most of the computers in the school district has that as a resolution. This size limitation for the screen meant that for long menus, such as the list of elementary schools, we needed to form multiple columns of menu entries so that the menu list would not run off the bottom of the page. Unfortunately, because text in the menus is a lot wider than it is tall, we can only fit 3 columns onto the requested screen resolution before the menus start running off the right side of the screen. This means that we can only fit 39 menu items in one section at once onto the smaller resolution screens. If an end-user was using a larger resolution, such as 1280x1024, they would be able to see more menu items, but we want to support older hardware running at a low resolution, because many of the families in Worcester who own computers still are using machines with outdated hardware. This should not end up being a problem though because with the exception of the list of elementary schools none of the categories have more than 10 items. The style guide we created for the website states that you should not give something more then 10 subcategories because our research showed that when it gets larger than that the menu starts to get harder to use because it can begin to seem cluttered.

WPS Website Editors' Style Guide

Font Selection Guidelines:

→ Choose a font as Arial or Times New Roman. The reason for this is that not everyone my have these fonts and they could be harder to read for some people. Keep in mind that people who cannot read the website will become frustrated and be reluctant to use the website as the resource it was intended to be.

→ Avoid choosing a non-standard font. The reason for this is that people viewing the website do not want to find and download the font you chose, and do not want this website installing said fonts onto their computers to enable the site to be viewed properly.

→ When choosing a font size for your content, be mindful of various people's needs. Do not choose a font that is extremely large, or one that is diminutive. In most cases it is best to use the default font size. If you want to specify a size HTML font size 3 or 4 should be appropriate for your needs.

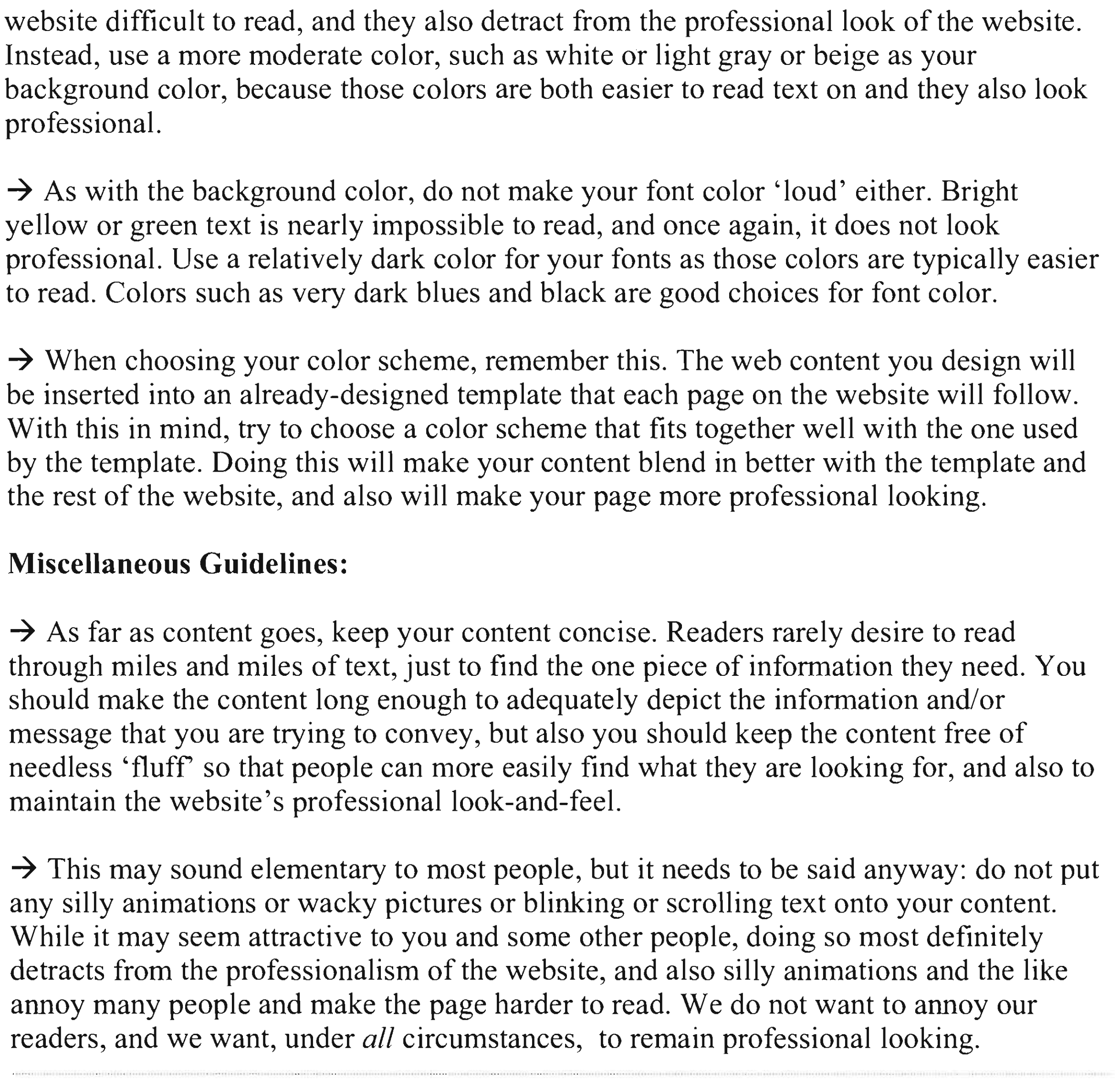
Font Style Guidelines:

→ Do not use bold face font, underlined text, and italics excessively. Each type of font decoration should be used appropriately. For example, both bold face and italics can be used to emphasize words or ideas. Also, italics can be used when inserting an excerpt of some other document into your content. Underline should be reserved for links only, so as not to confuse the reader to what's a link and what's not. Do not use strike through in your content, as it is annoying to read. While following this guideline, please also be consistent with your choices. If you use bold to emphasize text, always use bold for emphasis. Consistency also avoids confusing the reader.

→ Do not type in all capital letters. The reasons for this are twofold. Firstly, typing in all capital letters makes it seem as if you are shouting at the reader, if you need to put emphasis on an idea or a word, use bold face or italics. Secondly, the use of all capital letters is very un-professional looking. At all times the goal of this website is to look professional so that the site's viewers will take it seriously.

Color Selection Guidelines:

→ Do not use 'loud' colors, such as neon green, pink, or yellow as the background color for your pages. The reasoning behind this is that loud colors make the content of your



website difficult to read, and they also detract from the professional look of the website. Instead, use a more moderate color, such as white or light gray or beige as your background color, because those colors are both easier to read text on and they also look professional.

→ As with the background color, do not make your font color ‘loud’ either. Bright yellow or green text is nearly impossible to read, and once again, it does not look professional. Use a relatively dark color for your fonts as those colors are typically easier to read. Colors such as very dark blues and black are good choices for font color.

→ When choosing your color scheme, remember this. The web content you design will be inserted into an already-designed template that each page on the website will follow. With this in mind, try to choose a color scheme that fits together well with the one used by the template. Doing this will make your content blend in better with the template and the rest of the website, and also will make your page more professional looking.

Miscellaneous Guidelines:

→ As far as content goes, keep your content concise. Readers rarely desire to read through miles and miles of text, just to find the one piece of information they need. You should make the content long enough to adequately depict the information and/or message that you are trying to convey, but also you should keep the content free of needless ‘fluff’ so that people can more easily find what they are looking for, and also to maintain the website’s professional look-and-feel.

→ This may sound elementary to most people, but it needs to be said anyway: do not put any silly animations or wacky pictures or blinking or scrolling text onto your content. While it may seem attractive to you and some other people, doing so most definitely detracts from the professionalism of the website, and also silly animations and the like annoy many people and make the page harder to read. We do not want to annoy our readers, and we want, under *all* circumstances, to remain professional looking.

Figure 11-1 Style Guide

Another limitation of our system was mentioned above in the section about design changes during development. The limitation is that the User Management Subsystem only supports each user belonging to one group. As of right now, there is no problem with this implementation, because there isn’t a situation that would require the system to support users belonging to multiple groups. The limitation is, admittedly, a design decision that was made just to save time in the implementation process, but we do not envision this harming the usability of the system in any way.

User Testing

From user testing with people in the school department we were able to get user feedback on the usability of our system. For the most part the feedback was positive. One of the features that seemed to be liked was the fact that one could log into the system and make their edits from anywhere with internet access. This is different from the current system in that one can only make edits to the webpage from a computer that is on the school departments network. They were not able to make changes at home as they are able to with the new system. The fact that the editor interface was very similar to Microsoft Word and Microsoft Front Page was also received very well.

The way the user / group structure was set up was received positively because of the way that it allowed permissions to be set up. One can configure the system to have the webmaster have access to only what they are supposed to. A feature that this adds that we did not consider is that accounts could be created for teachers at individual schools. Currently with the old system if a teacher wanted to have a website they were supposed to create one in Microsoft Word and submit that to their webmaster. This causes problems in that it creates more work for the webmaster, and since the page is submitted in a Word document it needs to be converted into html. With the new system the teacher can just have an account that gives them access to their own personal page and they can modify it from the online editor. They could then submit it for approval themselves.

The only negative feedback that we got was with adding images. While someone who is use to making websites in html would have no trouble adding graphics using out editor, someone who has experience only with FrontPage might have problems because they can no longer copy and paste images into the editor. In addition, they also wouldn't have access to the clipart database. While clipart would / should not be needed at the upper levels of the website, at the lower levels, especially at the elementary school level, clip art is something that webmasters would like to have. In order to address this problem we created a webpage that has thumbnails and links to clipart that people can use.

The help documentation was found to be very useful in explaining how the whole system worked (see **Appendix C-1**). It seems likely that most people could figure out how to use the system reasonably well from the documentation.

Future Work

As for future work that needs to be done on the project, the major thing left is that the content for the website needs to be created. Most of this will just involve copying and pasting information from the old site. This will probably be done by the webmasters that are responsible for each part of the site now. This makes the most sense because they are already being paid for their work on the website and each of them should have a good understanding of what content belongs there and is up to date. We suggest that the best way to approach this is to give all of the webmasters a certain amount of time; one to two months would probably be the best number. In this time have the webmasters prepare all of the content for their section of the site and have it up and running, then replace the preexisting version of the site with the new one.

A lot of the information gathering that was conducted should be very helpful to the webmasters in building their section of the site. The style guide will also be very useful in keeping the site professional looking and uniform.

The only other piece of future work that will probably be required is moving the website over to another server. The current server it is running on does not seem to be powerful enough to handle the site full-time. It appears slow to the end-user when there is just one person accessing it. Although it hasn't been tested with a large number of users, it would be a safe assumption to make that there would be a significant slowdown on this system with a large number of users.

In the event that the system needs to be modified, the source code for all of the pages is well documented. We have also provided a programmer's guide that gives a brief description of what each php file does as well as what the functions in it do. There is also a description of all the SQL tables that the system uses (see **Appendix D-1** for the

Programmers Guide). We don't anticipate any large changes being needed, but in the case that they are, the Programmers Guide should be helpful to whoever works on it.

Conclusion

In conclusion, we consider the project a success. Although the project's goal evolved from a simple website redesign to a complete overhaul and development of a backbone for the new website, it ended on a successful note. As mentioned above in the system limitations section, the system that we have developed is not perfect, but we believe it is more than capable of meeting the needs for the Worcester School Department. To verify this assumption, we are beginning to conduct user tests of our system to mainly accomplish two goals: find any remaining bugs in the system so that we can repair them, and also to make sure the the system's functionality is sufficient for the needs of the Worcester School Department.

Originally, the goal of this project, by our interpretation, was to simply redesign the website for the Worcester School Department by designing a new layout and user interface for the website. The project evolved into the development of the website management system that has been described in-depth above. This, in our opinion is one of our most significant accomplishments. The primary conclusion for this system is that the evolved form of this project is far superior to its original form. If we simply redesigned their website, then in 5 years or so, they'd be right back where they are right now, stuck with an outdated website and no easy way to update it. However, if we develop a system that makes updating a website very simple, then they will be able to get several website generations out of the system at least. In a sense, the project follows the old cliché, "Give a man a fish and you feed him for a day, teach a man to fish, and you feed him for the rest of his life." What we've done is give the Worcester School

Department an empty canvas that is easy to change where they can paint whatever picture they want, as many times as they want to do so.

Appendix

A-1, interview 01 ➔ quinsig elem school principal

1. yes
2. ---------
3. check hours, get info about other schools, school comparison, district wide information
4. -directions 5
   -athletic info n/a
   -school closings 2,3
   -phone numbers security,5
   -administrative forms 5
   -newsletter 5
   -academic calendar 5
   -school lunch menu 5
   -class information ----
   -faculty information 5
   -program explanation 5
5. after school programs, night classes, mcas info, textbook info, way to approach teaching, exit information, professional development, title1, major departments
6. no
7. fair, not bad, not great
8. no

A-2, interview 01 → teacher trainer

1. yes
2. -------
3. teacher links, instructions technology newsletter, contacting parents / awareness of whats going on
   4. -directions 5
      -athletic info 5
      -after school program info 5
      -school closings 2.5
      -bus routes 5
      -academic calendar 5
      -school lunch menu 5
      -class information 5
      -program explanation 5
      -faculty information 4
      -administrative forms 5
      -newsletter 3
4. pull-down menu w/ secondary side expanding menu
5. technology newsletter should be renamed tech integration
6. calendars hard to find
7. rollovers are hard to follow
8. navigation is terrible search doesn't work -> maybe use google search link to search wps website uniform layout with color scheme for each school photos of school, athletic fields

A-3, interview 02 → teacher trainer

1.yes
2.------
3.tech newsletter, training software, fall courses, how-to stuff
4.-directions 5
-athletic info 4
-after school program 1
-school closings 5
-academic calendar 5
-bus routes 0
-lunch menu 5 gets people to visit site
-class info 3
-program info 3
-faculty info 5
-administrative form 5
-newsletter 5
5.individual school shouldn't have input into layout, map of school, blueprints
6.profile info should link to DOE,
7.fair
8.calendar page couldn't be found

A-4, interview 04 → admin building secretary

1. yes
2. -------
3. to update it, get to email from home, address of a school, past/future calendars, school supply list
4. -directions 5
   -athletic info 0 for elem school / 5 for high school
   -school closings policy 5 closing posted 0
   -academic calendar 5
   -school bus routes 5
   -lunch menu 3
   -class info 3
   -program info 3
   -faculty info 0,1
   -administrative forms 0 now, 5 in future
   -newsletter 5
5. handbook excerpts, professional development requirement
6. internal staff
7. home use good, updating/maintainability poor
8. hard to find stuff when trying to fix that part of the site

A-5, interview 01 → Faculty

1. yes
2. -------
3. to do updates, look up calendar events, work on the federal programs section of the site
4. -directions 5
   -athletic info 5
   -after school program info 5
   -school closing procedures 5
   -academic calendar 5
   -school bus routes 5
   -school lunch menu 5
   -class information 6
   -program information 2
   -faculty info 2
   -administrative forms 4
   -newsletter, events 4,5
5. staff development information, grats/accounts department
6. not user friendly, need to not be able to stumble on outdated stuff
7. 2
8. no, can just log in to the server and find it

A-6, interview 02 → Dougherty high school, Teacher

1. yes
2. ------
3. journalism class uses the site, teacher names & info, sport schedules, school newspaper
4. -directions 5
   -athletic info 5
   -after school programs 5
   -school closing info 5 (suggested posting on main page, or having a mailing list)
   -academic calendar 5
   -school bus routes 5
   -school lunch menu 5
   -class information 5 (suggested posting teacher lesson plans)
   -program information 5
   -faculty information 4,5
   -administrative forms 5
   newsletter/events 5
5. lesson plan resources, DOE site for recertification, pdp's teaching methods, alumni success page
6. get rid of the mundane layout!!!!
7. 4,5
8. yes, but doesn't remember what it was

A-7, interview 03 → Dougherty high school, Teacher

1.yes

2.------

3.email, school curriculum, Dougherty's site is up-to-date / other schools' aren't, research

4.-directions 4
-athletic info 5
-after school information 5
-school closings 5
-academic calendar 5
-school bus routes 3
-school lunch menu 3
-class information 5
-program information 2
-faculty information 5
-administrative forms 5 (strongly suggested teacher log-in for access)

5.handbook excerpts, teacher-only portal for administrative forms

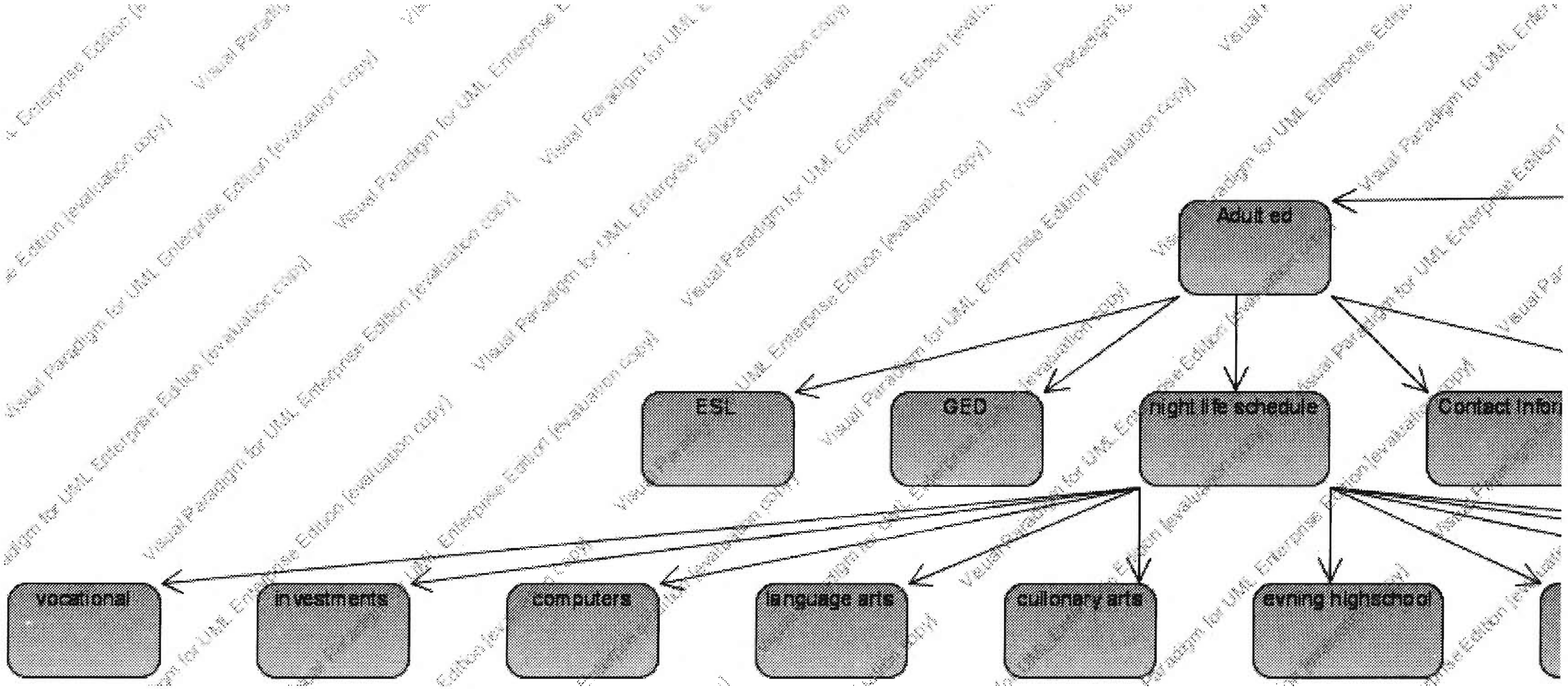
6.site is hideous looking

7.3.5

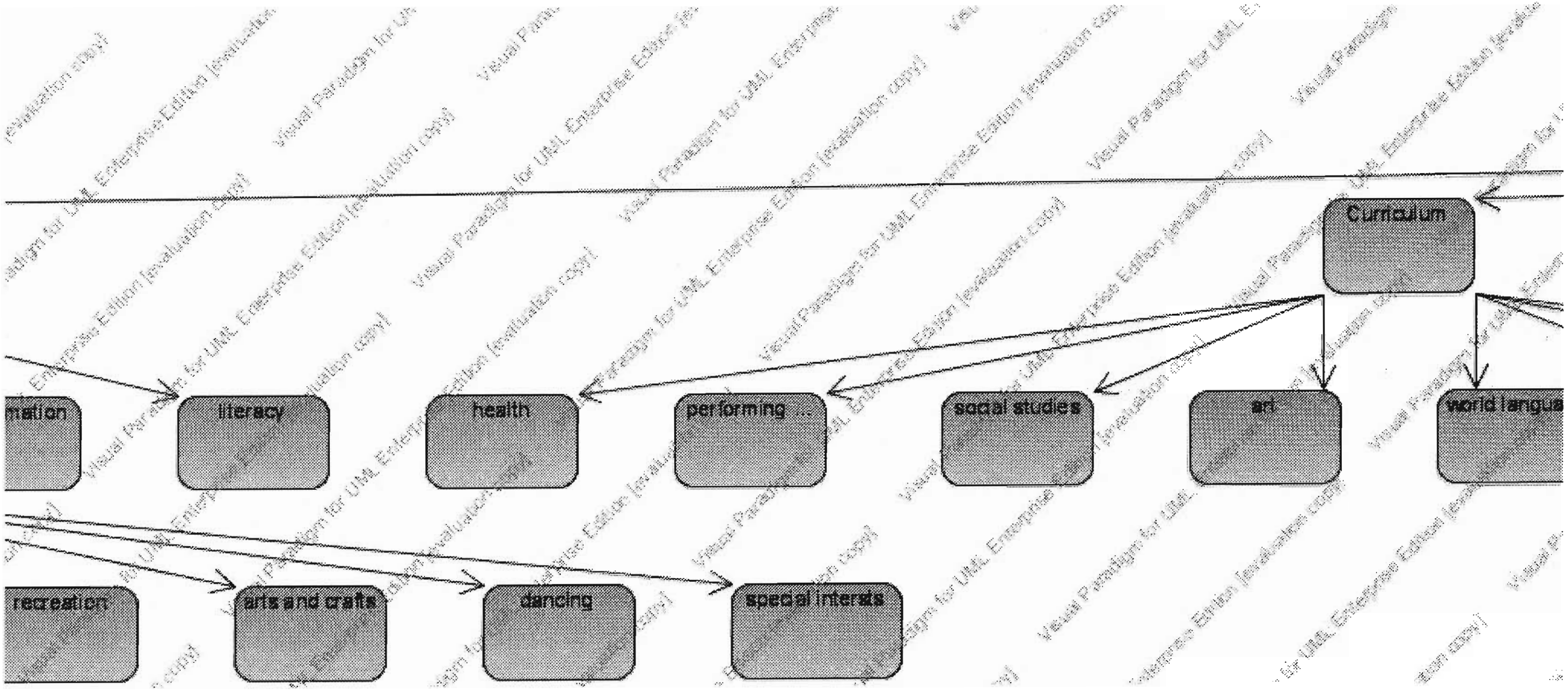
8.yes → budget information, suggests using google or other search engine to search the site

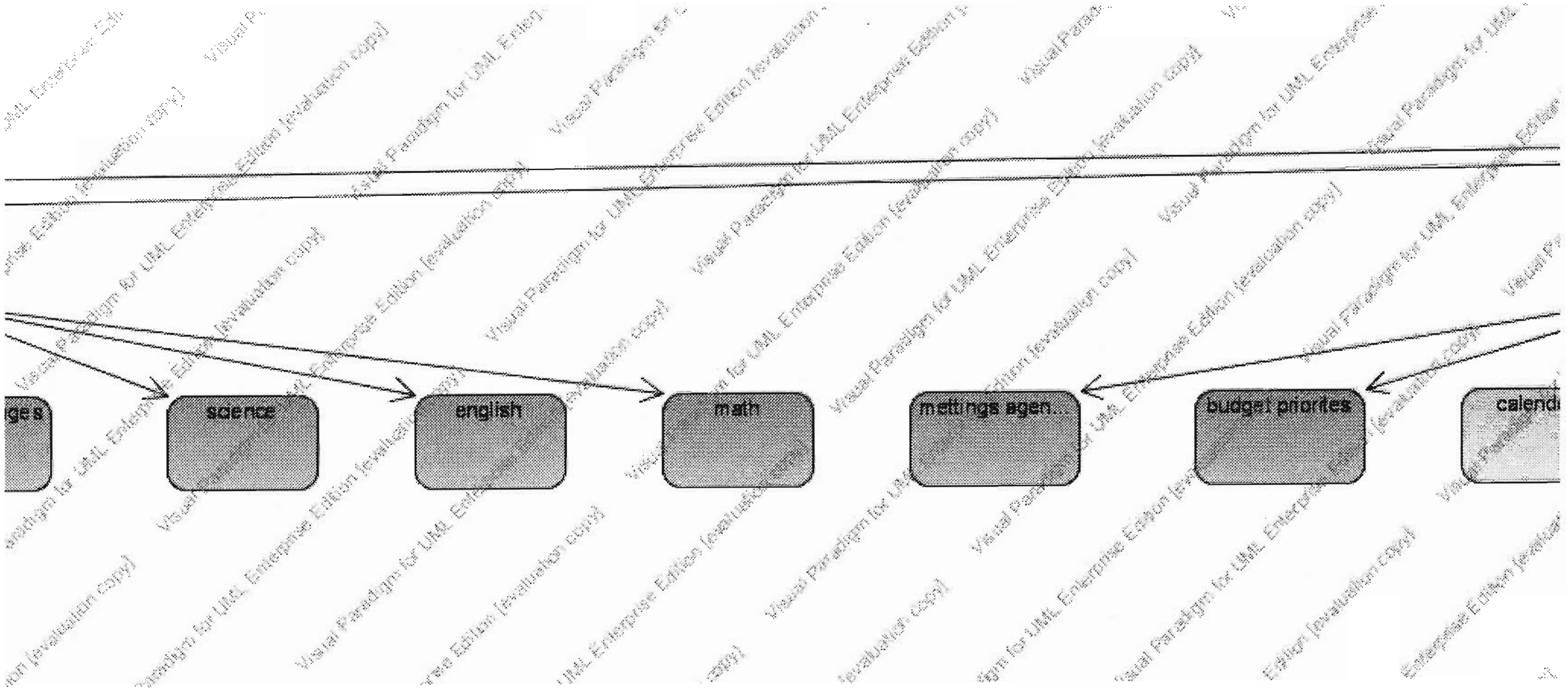
A-8, interview 04 → Dougherty high school student

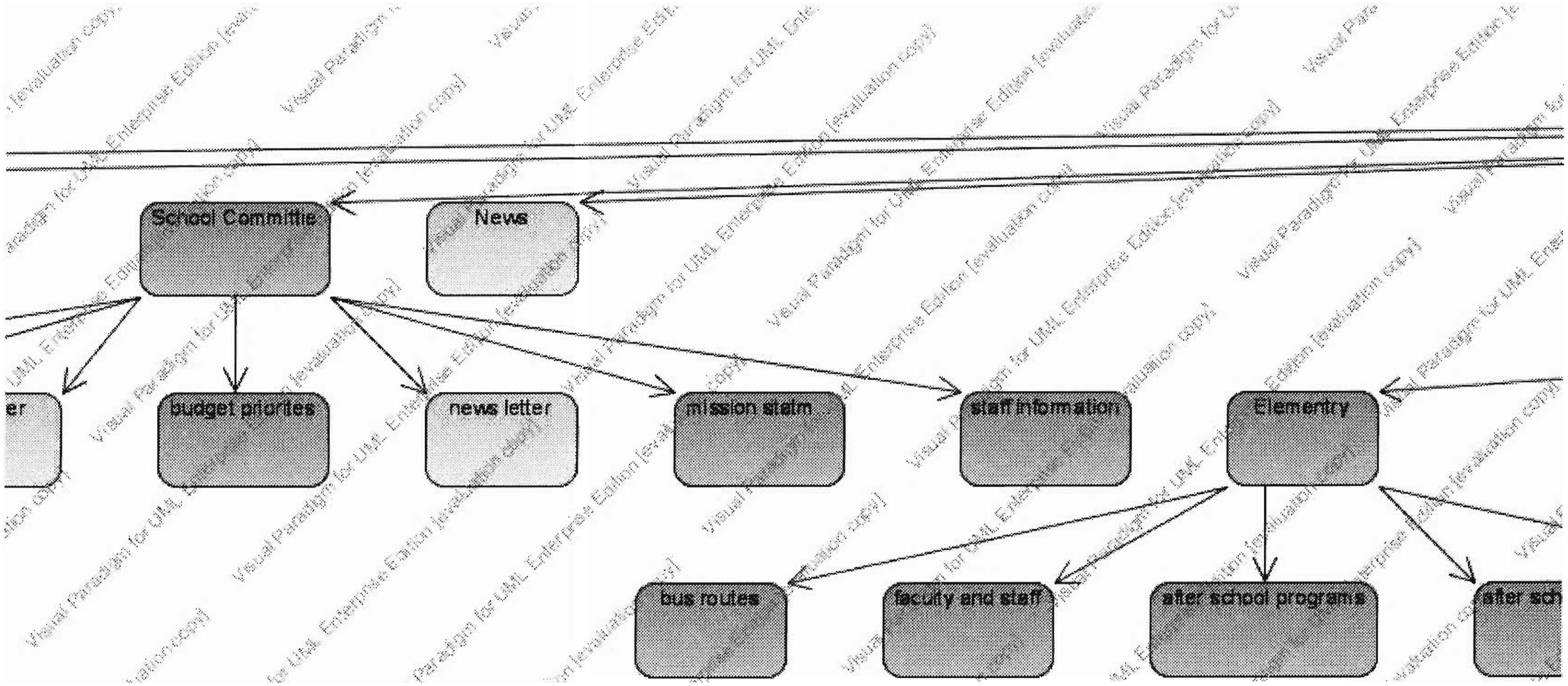
1. yes
2. ------
3. media centre/library, check links from library, check out books, not used for event updates
4. -directions 4
   -athletic info 5
   -after school program info 5
   -school closings 4 for policy, 0 for posting closings
   -academic calendars 2 for students because teachers post them, 3,4 for others
   -school bus routes 5
   -school lunch menu 0,<1
   -class information 1,2 for syllabus/curriculum, 5 electives information
   -program information -----
   -faculty information 3,4 briefly explain who teaches what
   -administrative forms 0
   -newsletter/events not necessary because students given all the info
5. SAT dates, elective information
6. no
7. 5
8. navigation troublesome for new users, fine for non-new users, pretty easy to find stuff

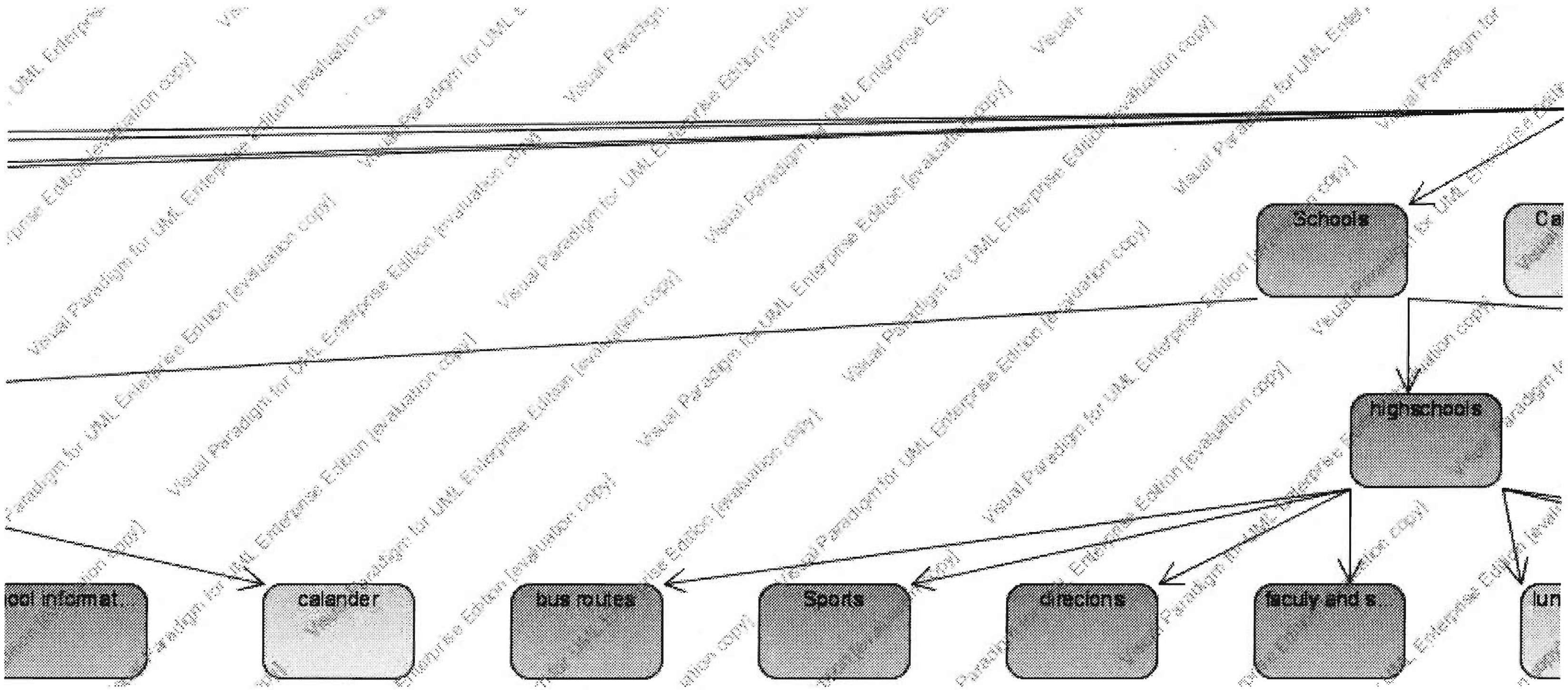

Adult ed
ESL
GED
night life schedule
Contact Infor
vocational
investments
computers
language arts
culionary arts
evning highschool

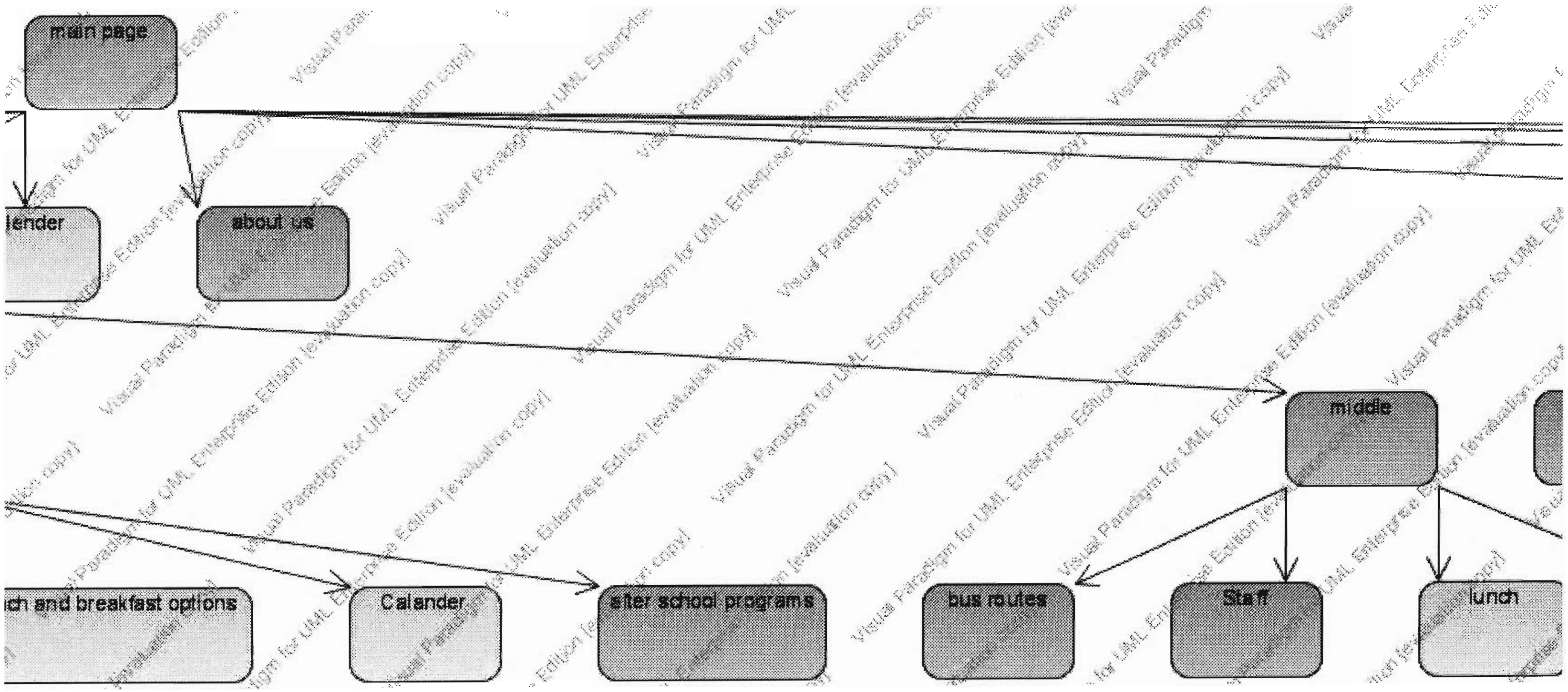
B-1

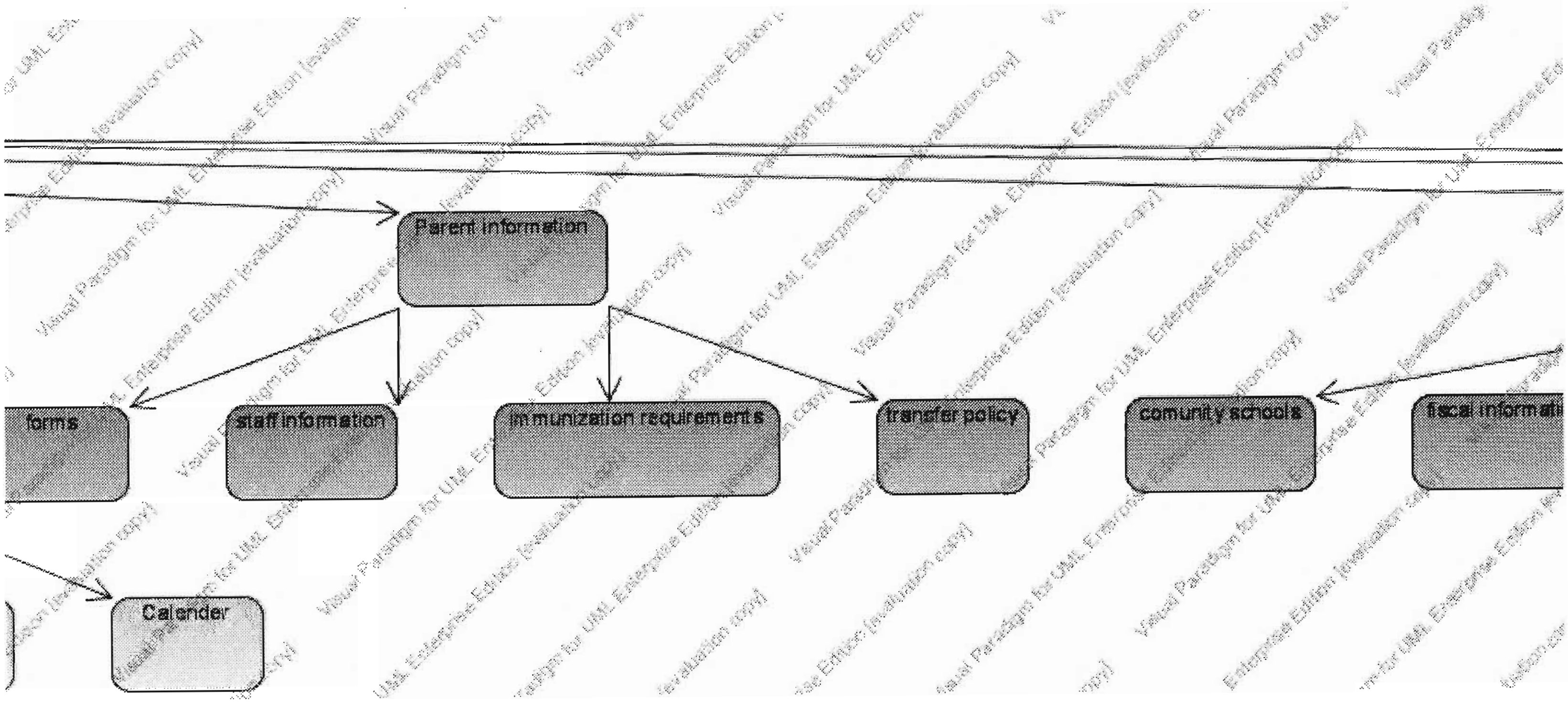

Curriculum
mation
literacy
health
performing ...
social studies
art
world langua
recreation
arts and crafts
dancing
special interests

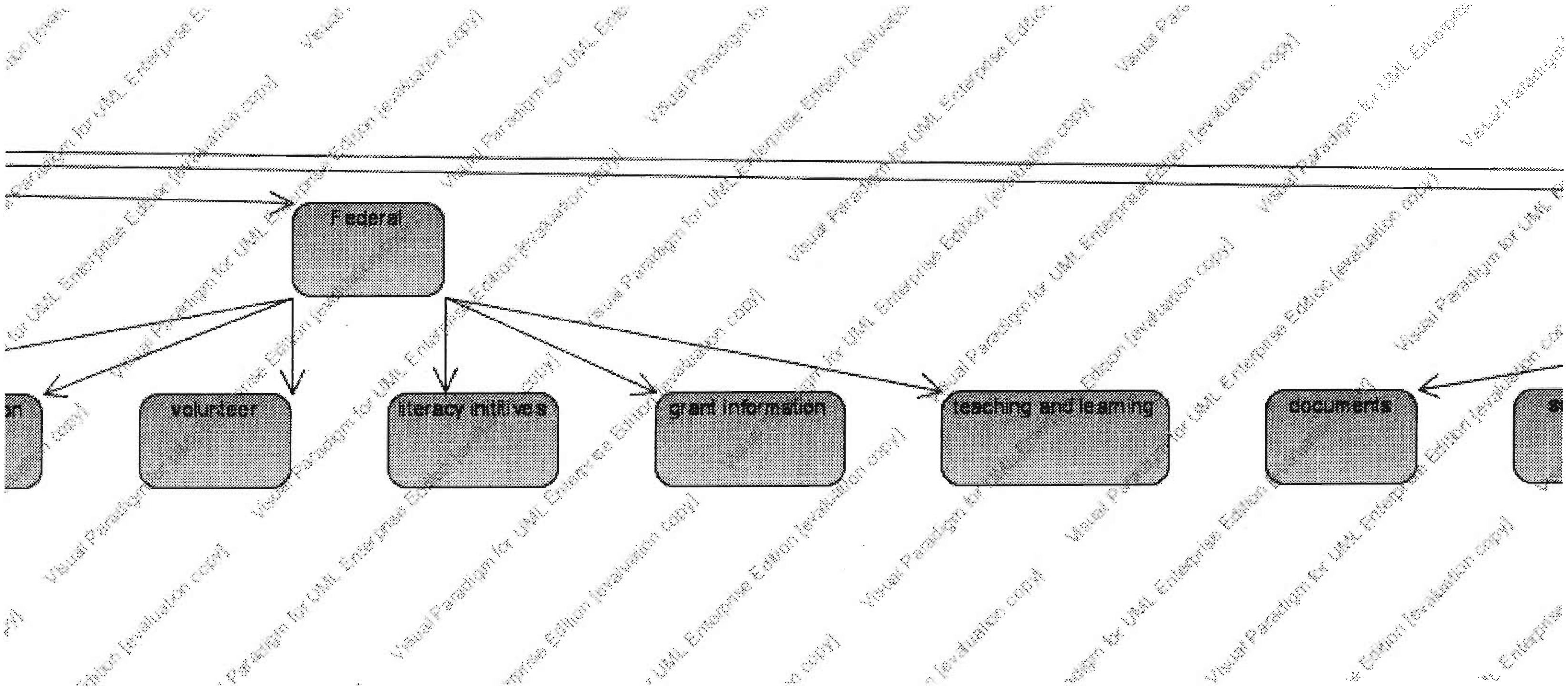

ges
science
english
math
mettings agen...
budget priorites
calende

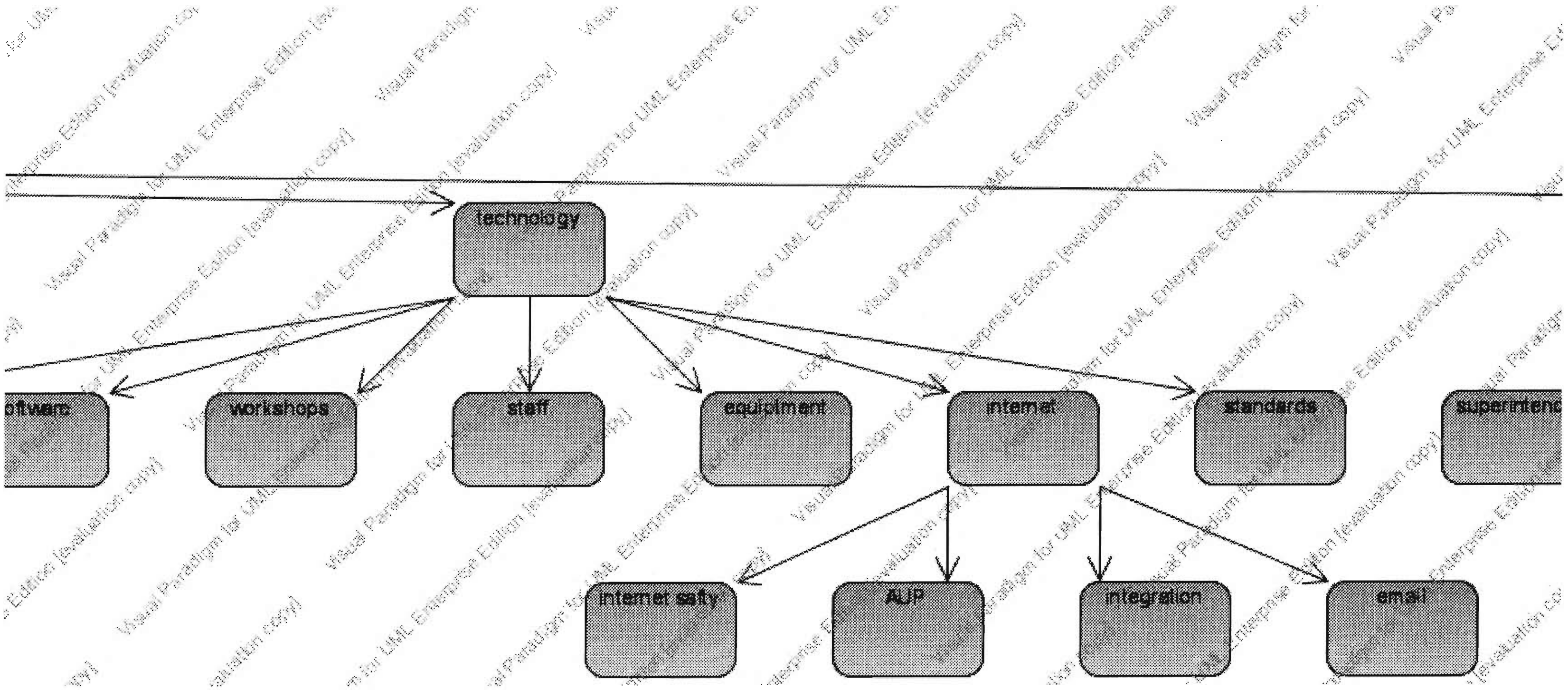

School Committie
News
er
budget priorites
news letter
mission statm...
staff information
Elementry
bus routes
faculty and staff
after school programs
after sch

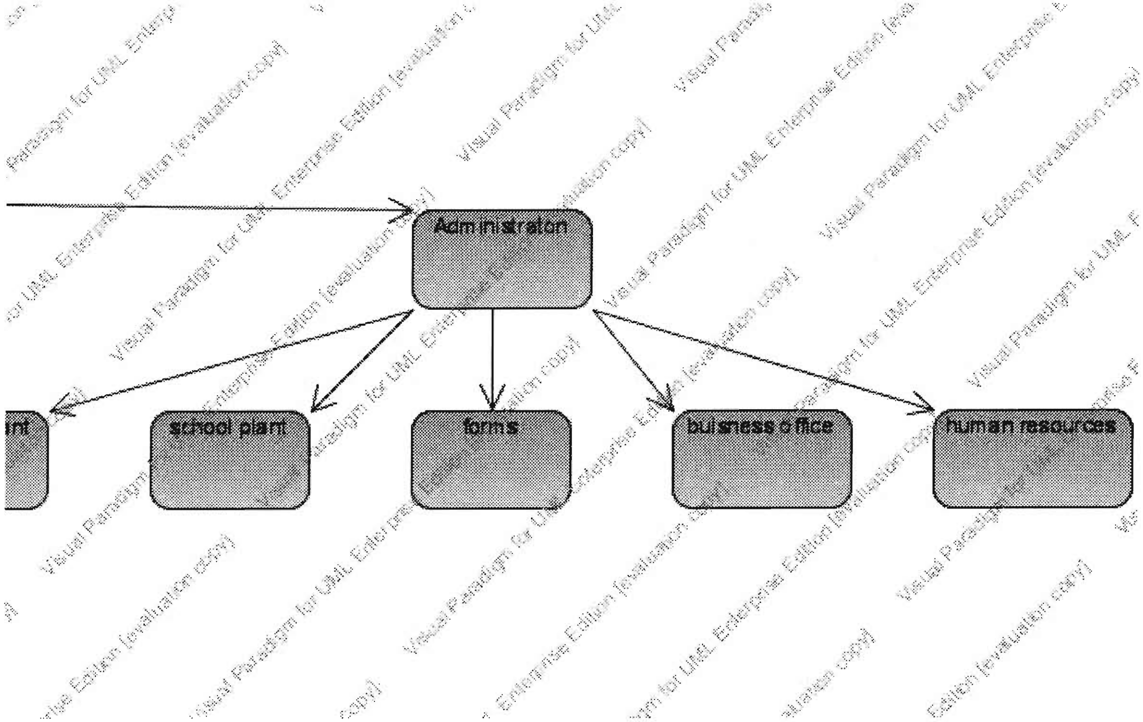

Schools
Ca
highschools
ool informat...
calander
bus routes
Sports
direcions
faculy and s...
lun


main page
lender
about us
middle
ch and breakfast options
Calander
after school programs
bus routes
Staff
lunch


Parent information
forms
staff information
immunization requirements
transfer policy
comunity schools
fiscal informati
Calender


Federal
on
volunteer
literacy inititives
grant information
teaching and learning
documents
se


technology
oftware
workshops
staff
equipment
internet
standards
superintenc
internet safty
AUP
integration
email


Administraton
nt
school plant
forms
buisness office
human resources

C-1

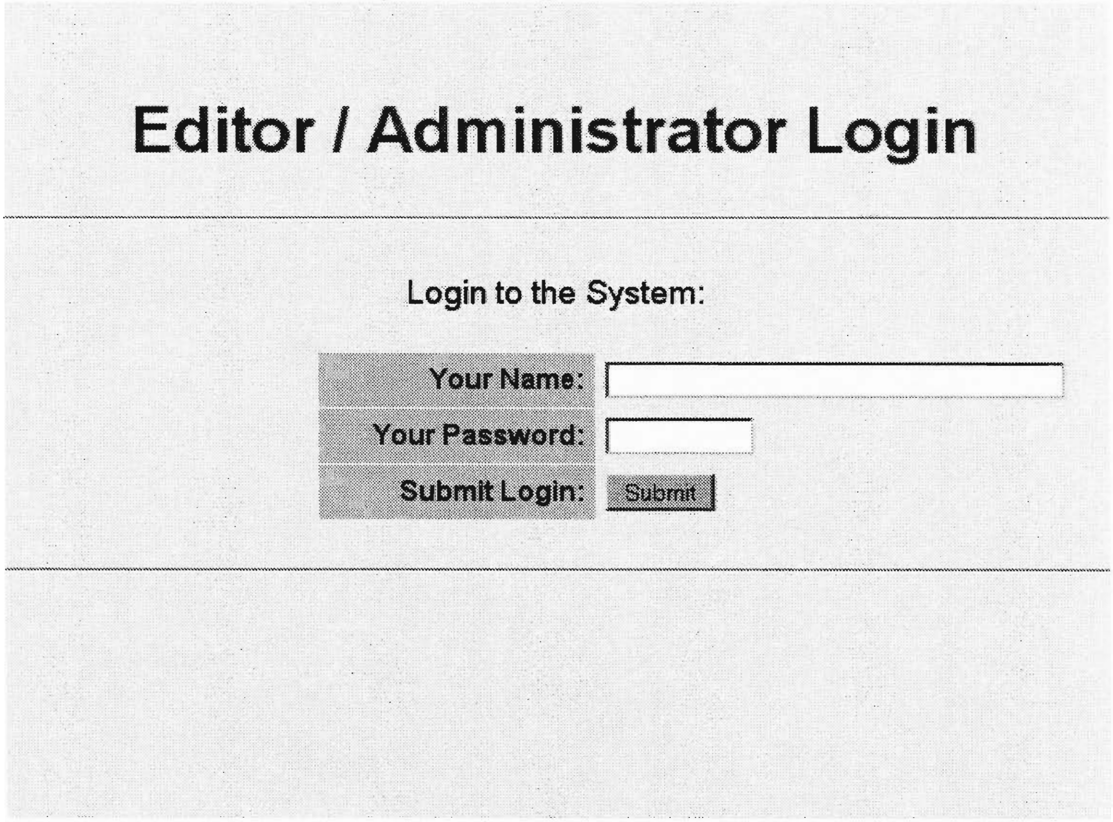
Getting Started: Logging In

Hello, and welcome to the Worcester Public Schools Website Management System! This system is used to facilitate the easy management of the school department's website. Using this system, website editors and managers can create, update and remove pages of content for the website, and also they can manage the user accounts for this system, by changing website administrators, adding users, removing them and updating their user accounts.

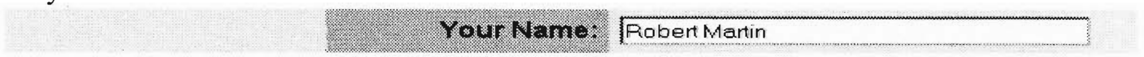
If you're reading this, you probably need a little assistance getting started and familiarizing yourself with this system. That's what this page is for. Read on to learn all the little nooks and crannies involved with using this system.

Logging Into the System

Below is a picture of what you should see when you first arrive at this system. It is the system's login screen. From here you can log into the system, which will allow you to use all of the tools available to you to manage the Worcester Public School Website.



Now, lets log into the system. In the image above you see three input fields: a text field for your name, another textbox for your password, and a 'Submit' button. To begin, enter your full name as it is stored in the system into the text field labeled 'Your Name'. For instance if the system stores your name as Robert Martin, that is what you should enter into this text field. Consult your system administrator if you are unsure how the system has your name stored.

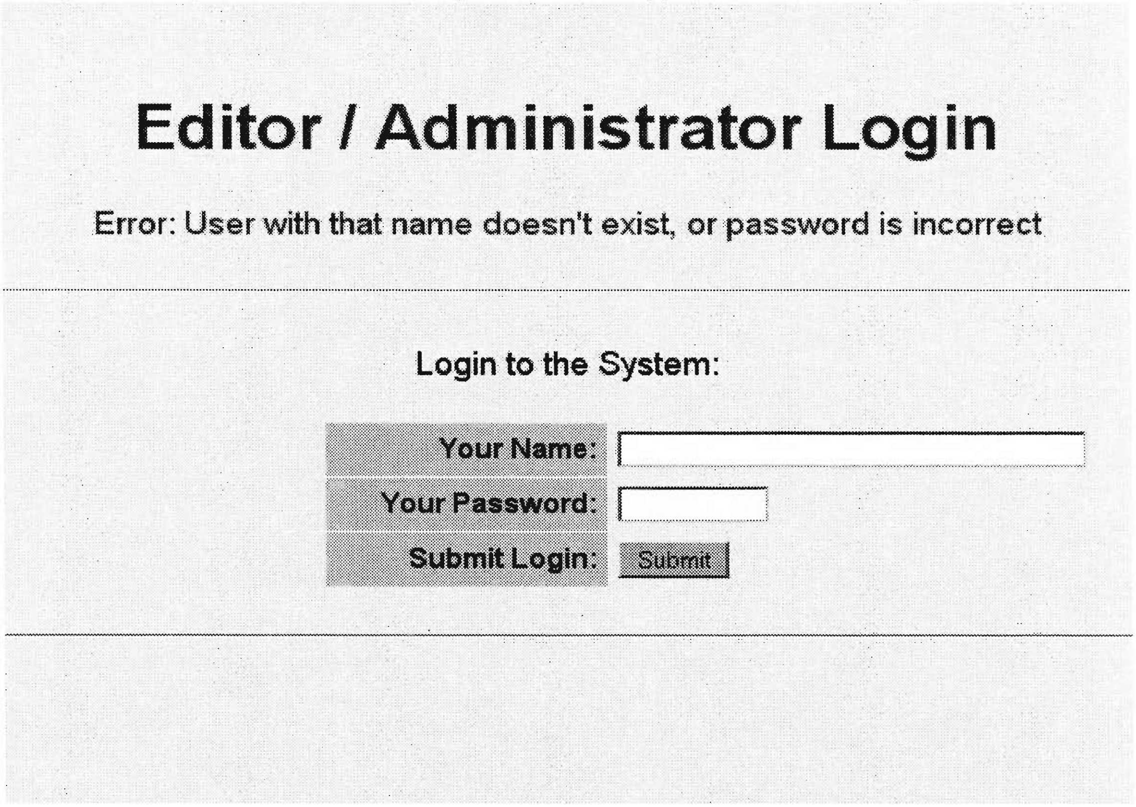


Your Name: Robert Martin

Next, you must enter your password into the system. The second text field is where your password must be entered. For your privacy, when you enter your password, it will appear on the screen as all asterisks. If you have forgotten your password, consult your system administrator and he/she will be able to re-set it.

Finally, the last step to logging in is to click the button called 'Submit' that is located next to the words 'Submit Login'. If your full name and password were entered properly, you will be logged into the system.

If you mistyped either your password or your name, you will instead be brought back to the login screen, and an error message in red will appear like in the image below.

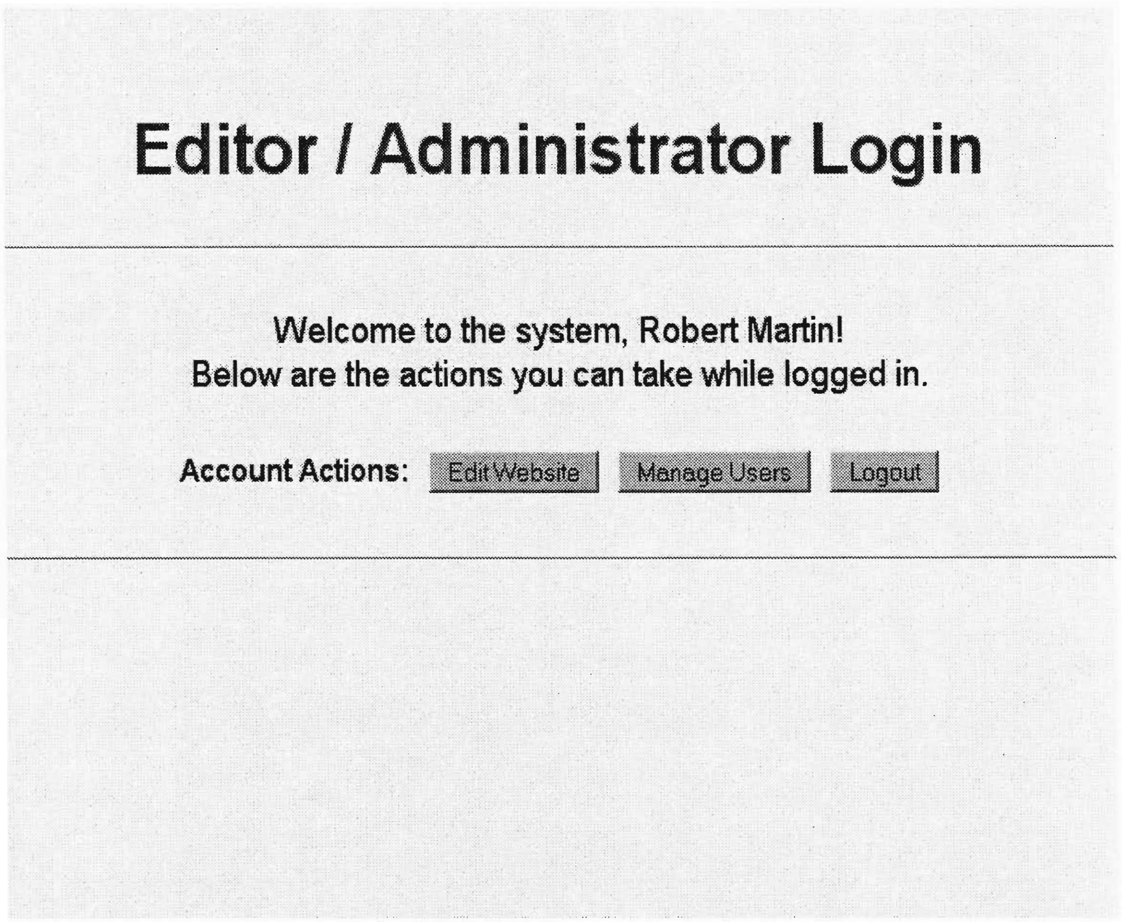


Editor / Administrator Login

Error: User with that name doesn't exist, or password is incorrect

Once You Are Logged In

If you have successfully logged into the system, you will see a small menu screen with three options. This is depicted below.



Editor / Administrator Login

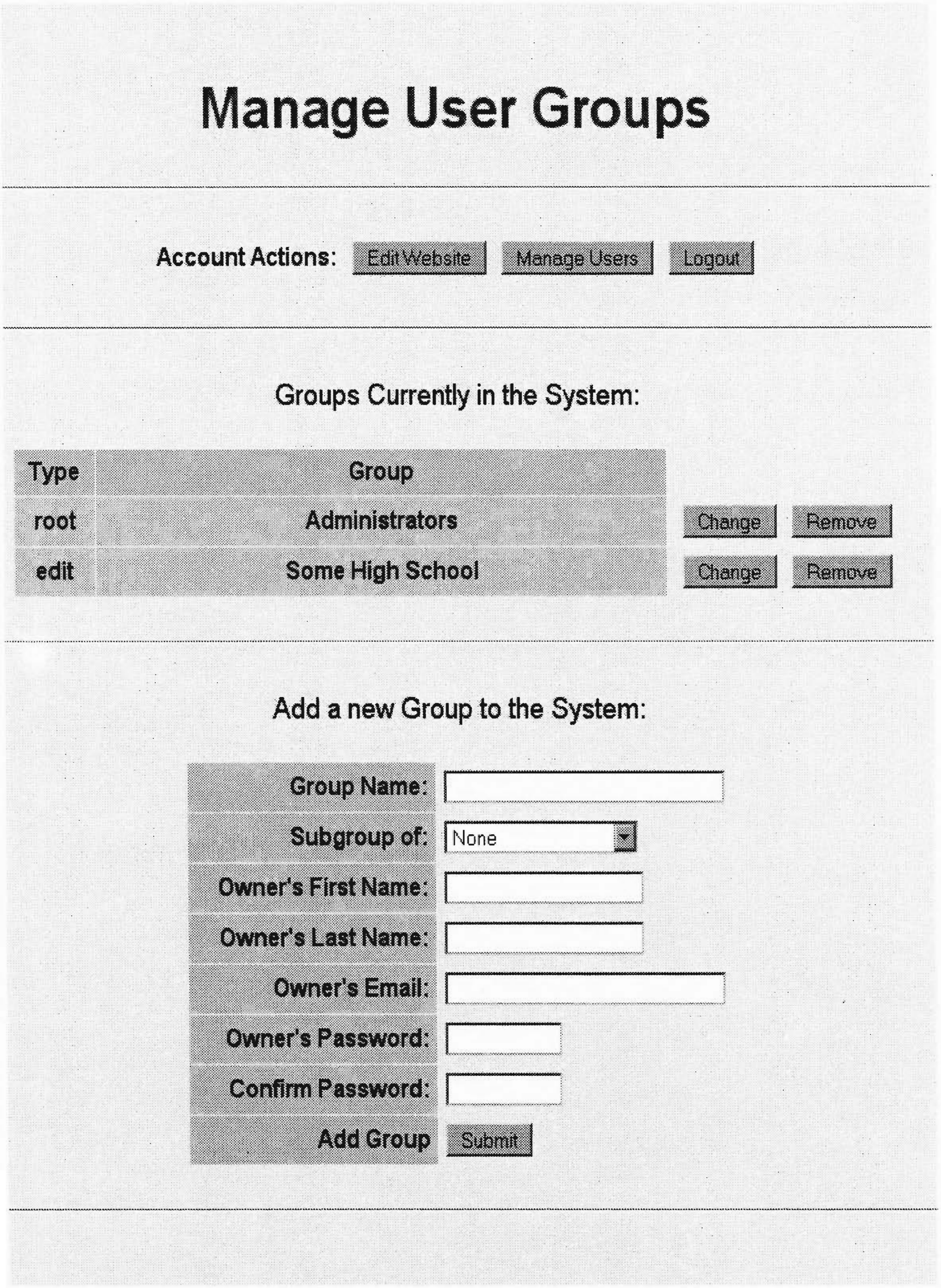
Welcome to the system, Robert Martin!
Below are the actions you can take while logged in.

The button labeled 'Edit Website' will take you to the website editing screen, where you can make changes and additions to the content of the Worcester Public Schools Website. The button titled 'Manage Users' takes you to the user management system, where you can change the status of your own user account, and if you have permission, change the accounts of other users in the system. The final button, named 'Logout', will log you out of the system and return you to the login screen.

Getting Started: Managing User Groups

Welcome to the User Management page! This section will serve as an overview as to how the user accounts are structured in this system. Basically, users are separated into groups of users. Each department of this website, such as a particular school or the District Administration Building, has their own section of the website, and therefore, their own user group. Each user in the system is a member of exactly one group, and the list of groups is the root level hierarchy.

When you arrive to the User Management page, you will see the screen depicted below. There are three actions you can take to change the list of groups. They are removing a group, adding a new group to the system, and changing a group that is already in the system.



Manage User Groups

Account Actions:

Groups Currently in the System:

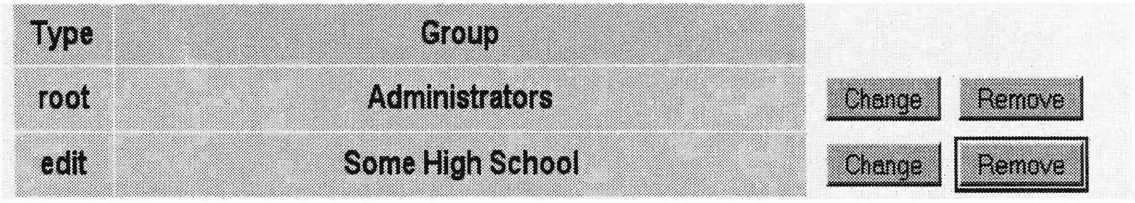
Type	Group		
root	Administrators	Change	Remove
edit	Some High School	Change	Remove

Add a new Group to the System:

Group Name:	
Subgroup of:	None
Owner's First Name:	
Owner's Last Name:	
Owner's Email:	
Owner's Password:	
Confirm Password:	
Add Group	Submit

Remove a Group from the System

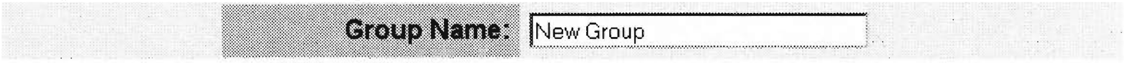
Removing a group is simple. Next to each group names in the list of groups is a button that is labeled 'Remove'. To remove a group of users, all you have to do is click on this button, and the group of users will be removed. The only exception to this is that th group called 'Administrators' cannot be removed, and if you attempt to do so, an error message in will appear in red text near the top of the page.



Type	Group
root	Administrators
edit	Some High School

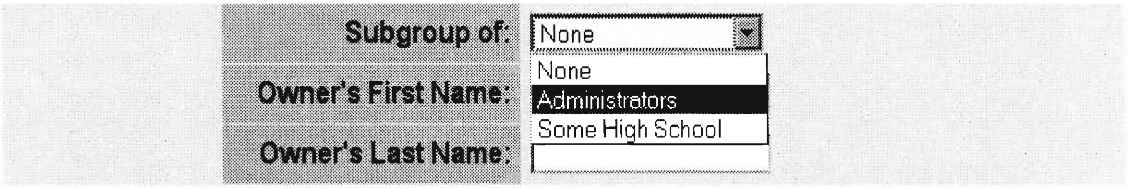
Add a Group to the System

In addition to being able to remove a group of users, you can also add a group of users to the system. In order to add a group to the system, you must specify several pieces of information. Firstly, you must specify the name of the group. This group name must be unique to that group. If you try to make a group with a name that is already in use, the attempt will fail. Below is a picture of where to enter the name of the new group.



Group Name: New Group

Next, you must specify the parent group for this group. What this parent is for is simple. Every group is either an isolated group by itself, or a subgroup of another group. For instance, if you are making a group for the Athletics Department of North High School, then the Group for the Athletics Department would have the group called 'North High School' as its parent. The reason for subgroups is that the section of the website for North High should include its Athletics Department. If both groups were isolated, this would not work properly. Use the drop-down menu depicted below to select which group this new group will be a child of.

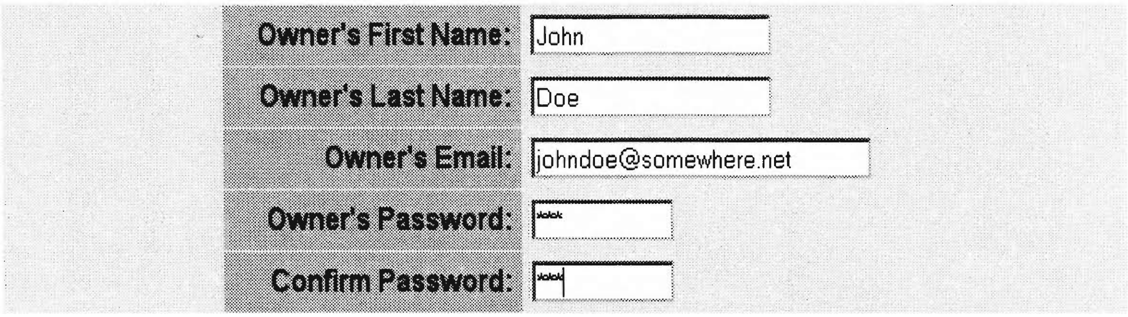


Subgroup of: None

Owner's First Name:

Owner's Last Name:

Every group must have what is called an owner. A group owner is like the leader or administrator of that group. Every group has exactly one owner, and when you create a group, you must specify who that owner is. The picture below depicts where you must place the information for this owner.



Owner's First Name: John

Owner's Last Name: Doe

Owner's Email: johndoe@somewhere.net

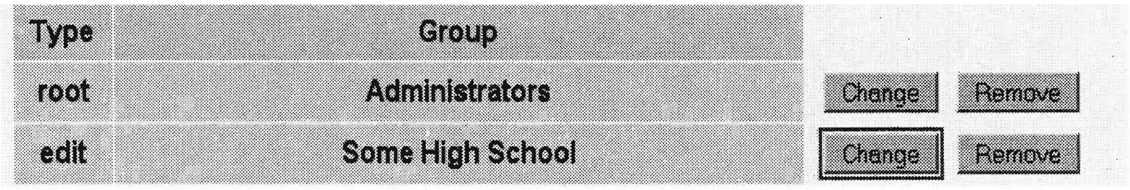
Owner's Password: ***

Confirm Password: ***

The information required to create the group's owner is: his/her first and last name, their email address, and their password. The password must be entered twice, to make sure that you do not type it incorrectly. If you accidentally enter a group name that already exists, or a owner name that already exists, or an invalid email address, or the passwords do not match, the appropriate error message will appear near the top of the page. If nothing went wrong, then the page will reload itself and the new user group will be listed among the older ones.

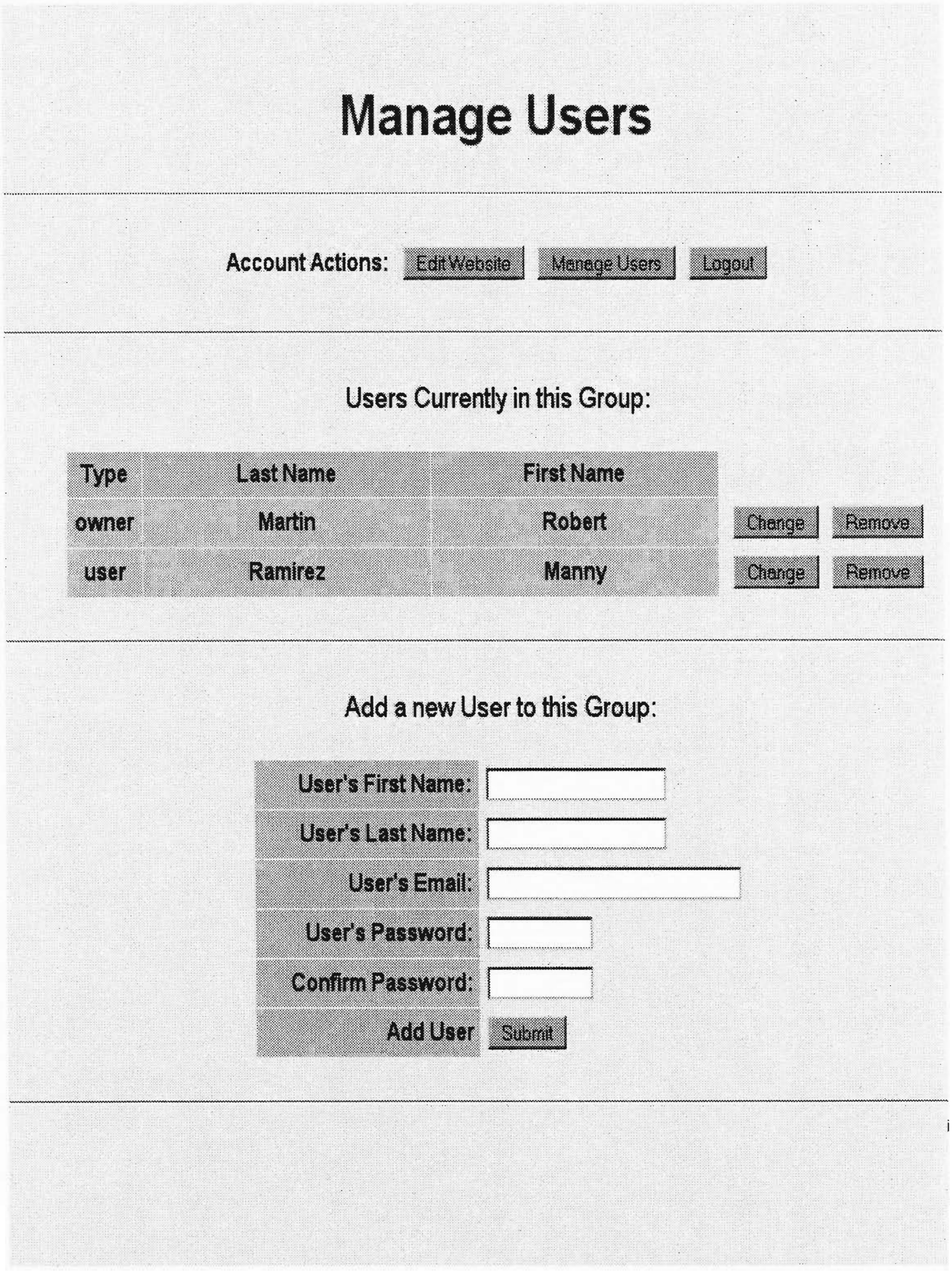
Change a Group

The third thing you can do to the list of user groups is change or modify one of the groups. By clicking on the button labeled 'Change' next to a group name, you will be able to change a group.



Type	Group
root	Administrators
edit	Some High School

Once you click on the button labeled 'Change' described above, you will see the following screen. This is where you can change the group you decided to change. There are three actions you can take to change a group: add a user to the group, remove a user from the group, or change a user's information.



Manage Users

Users Currently in this Group:

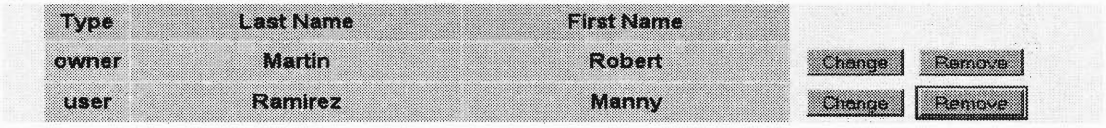
Type	Last Name	First Name		
owner	Martin	Robert	Change	Remove
user	Ramirez	Manny	Change	Remove

Add a new User to this Group:

User's First Name:	
User's Last Name:	
User's Email:	
User's Password:	
Confirm Password:	
Add User	Submit

Removing a User from a Group

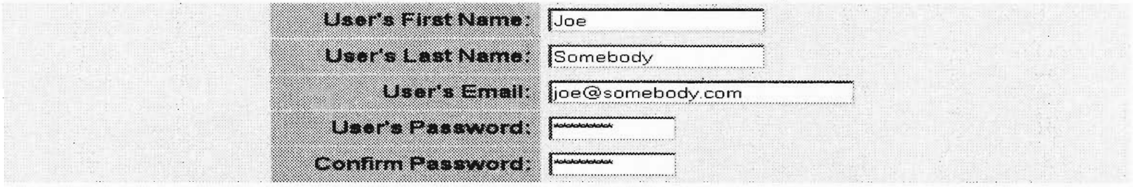
Removing a user from a group is very similar to removing a group from the system. Located next to the user's name is a button labeled 'Remove'. Simply click on this button to remove the user from the group. If you try to remove the user who is the owner of the group, the attempt will not succeed, and an error message will appear near the top of the page.



Type	Last Name	First Name		
owner	Martin	Robert	Change	Remove
user	Ramirez	Manny	Change	Remove

Adding a User to the Group

Adding a user is also fairly simple. On the Manage Users page, below the list of users in the group, are five text fields. They request the same type of information that was required for the owner of a group when you created a group of users. You must specify the new user's first and last names, their email address, and their password. Once again, the password needs to be entered twice, so that you don't mistype the password by accident. The picture below depicts these fields for specifying a user's information.

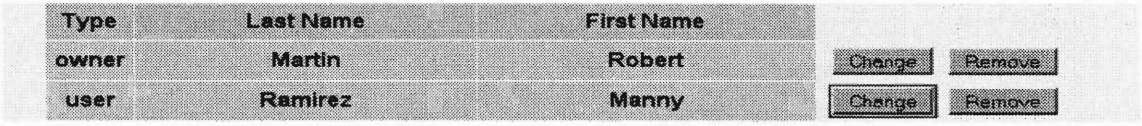


User's First Name: Joe
User's Last Name: Somebody
User's Email: joe@somebody.com
User's Password: ********
Confirm Password: ********

If you forgot to fill in any of the five text fields, or the passwords you supplied do not match, or the user's name already exists in the system, the attempt to create a new user will fail, and an appropriate error message will appear near the top of the page. If everything worked successfully, the new user will appear in the list among the other users in this group.

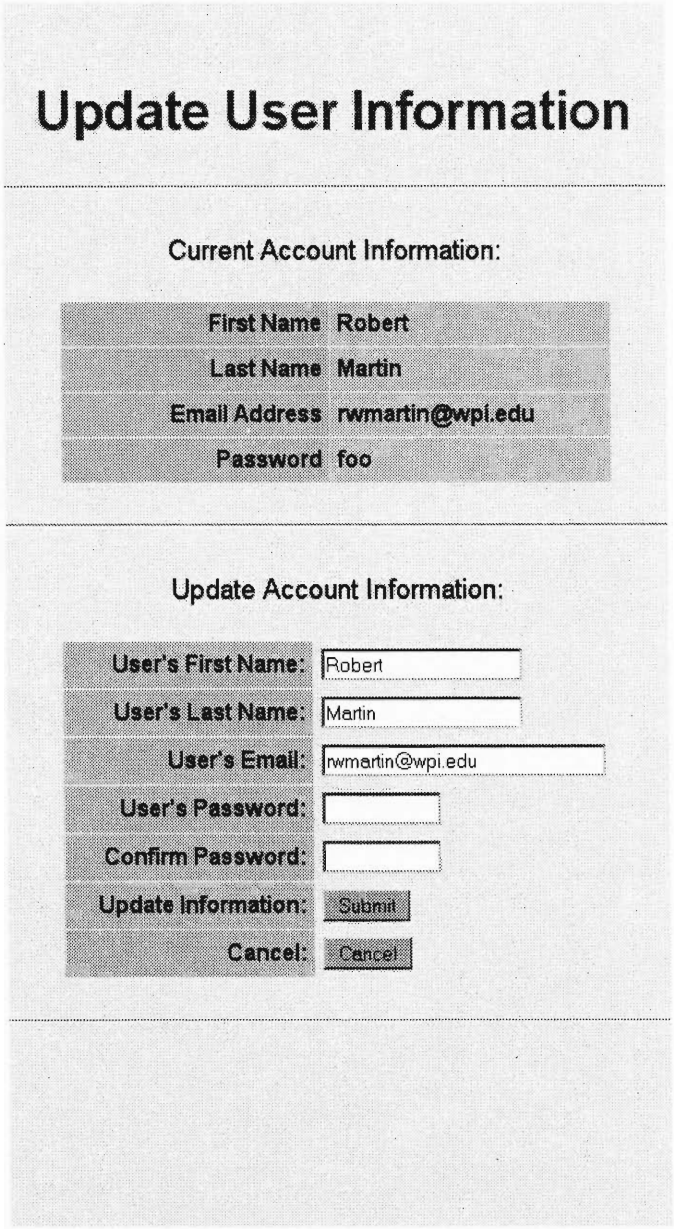
Changing a User's Information

To change the information about a specific user, click on the button next to his/her name labeled 'Change'.



Type	Last Name	First Name		
owner	Martin	Robert	Change	Remove
user	Ramirez	Manny	Change	Remove

Once you click on the button labeled 'Change' as described above, you will be taken to the following screen. This screen shows the current information for this user account, such as the person's name, email address and password.



Update User Information

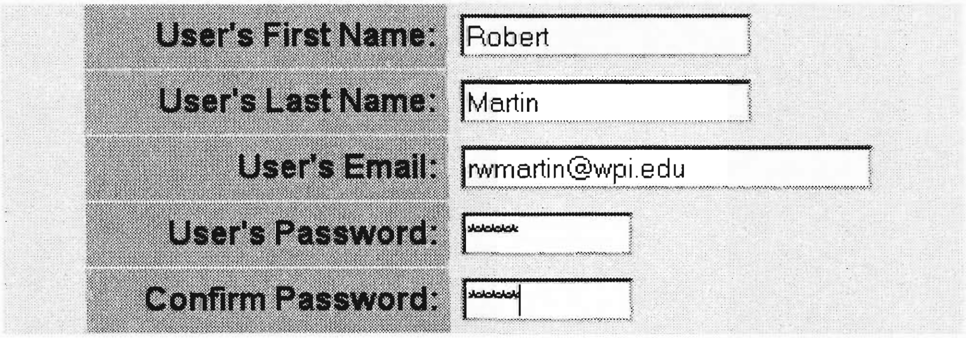
Current Account Information:

First Name	Robert
Last Name	Martin
Email Address	rwmartin@wpi.edu
Password	foo

Update Account Information:

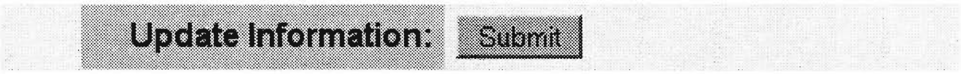
User's First Name:	Robert
User's Last Name:	Martin
User's Email:	rwmartin@wpi.edu
User's Password:	
Confirm Password:	
Update Information:	Submit
Cancel:	Cancel

Below this user's current information are five text fields. These fields have the same function as those described above for adding a user. You can fill out the text fields to update the user account with the new information.

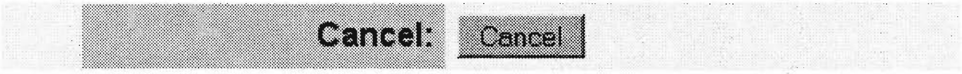


User's First Name:	Robert
User's Last Name:	Martin
User's Email:	rwmartin@wpi.edu
User's Password:	******
Confirm Password:	*****

To update this user account's information, click the button labeled 'Submit'. If the passwords you gave match each other, and the email address is valid, and the user name you specified doesn't match anyone else's in the system (except the current user), then the user's information will be updated, and you will be taken to the previous screen. If there was a problem, you will be shown an error message at the top of the page, and you can try to submit the information again.

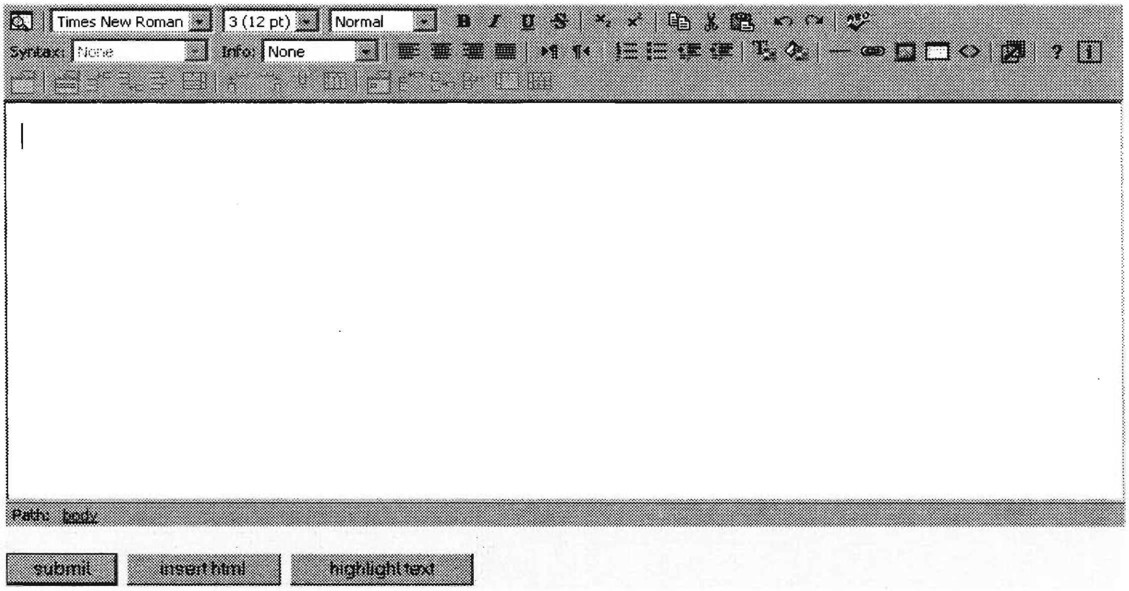


If you have changed your mind, and you do not want to change this user account's information, you can click the button labeled 'Cancel', and you will be taken back to the previous page.



Getting Started: Using the HTML Editor

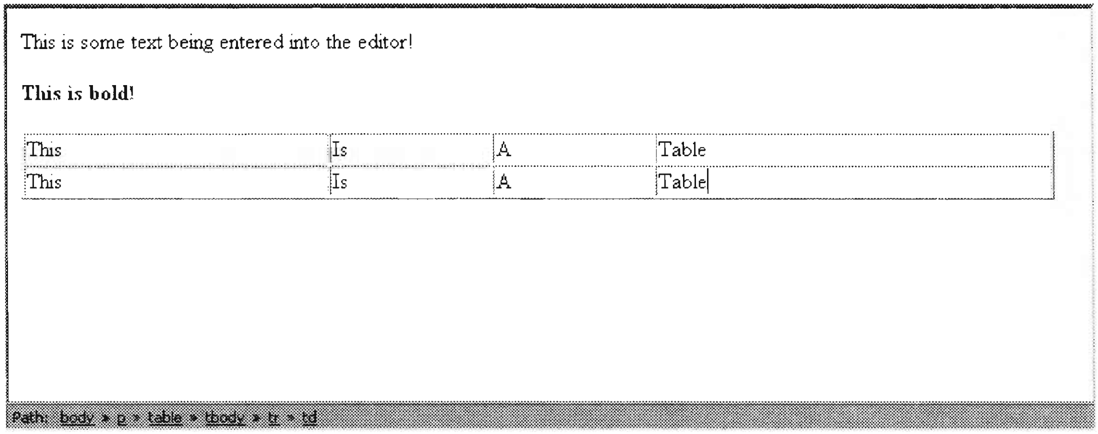
Now that you've chosen a webpage to edit, or decided to add a new webpage to the site, you will be taken to the HTML editor. This is the place where all of your modifications to the website's content will happen. The HTML editor is an editing environment similar in function and use to Microsoft's FrontPage. It is a WYSIWYG editor, which means that what you see in the editor is what you will see when the page is completed. The picture below shows you what the editor looks like.



Before we start, I'd like to take a moment to discuss a little about what you should be using this editor for. The new version of the Worcester Public Schools website is structured in a modular way. What I mean by this is that there is an underlying system that controls the website. This system has in it a template for what each page should look like. When a user visits the site, the system takes that template and stuffs your content into it. This ensures that everyone's pages will look the same. Also, it makes changing the look-and-feel of the website as simple as changing the template. The point of this discussion is to point out that you should only be developing the content area of the page you are making, because whatever you create will be stuffed into a pre-made template.

As you see in the picture of the editor page, there are three main sections to the editor page. They are, from top to bottom, the toolbar, the editor area, and the bottom buttons. We will cover each section in detail, so keep reading to learn how to use this powerful, but easy-to-use tool!

The first item we will cover is the editor area, because it is the simplest section. This section is basically the main editor window. You will enter all of your text and other content into this area, and it shows you what your webpage will look like, not including the template part. To use this section, simply type whatever text you want into it, and its that simple!



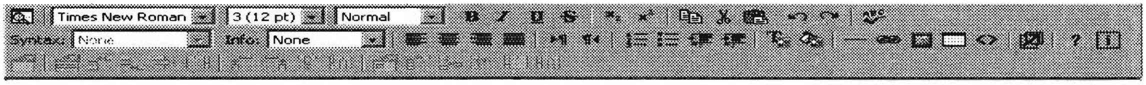
This is some text being entered into the editor!

This is bold!

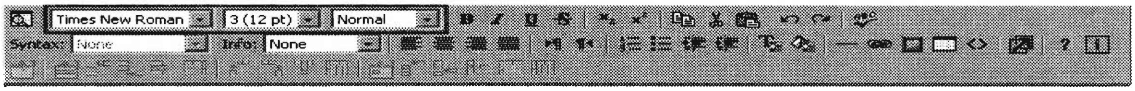
This	Is	A	Table
This	Is	A	Table

Path: body » p » table » tbody » tr » td

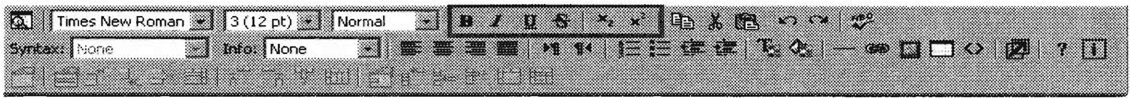
Next, let us talk about the toolbar section. In this section are a large number of tools you can use to make your webpage look great. You can do many useful things, like add images, change fonts, change colors, underline, bold, italics, add lists and links, and change the properties of the document.



First, let us discuss how to change your fonts, font sizes, and font type. If you look at the top row of the toolbar, on the left, you will see three drop-down boxes. These menus control the font you are using. The one on the left allows you to select a new font to use, such as Times New Roman, or Arial. Just click on the menu to bring down the list of fonts, and then click on a font name to select it. The middle menu controls the font size, and it works just like the left menu. Click on it, and then click on the size of the font you want to use. The menu on the right is for types of fonts. This means headers and normal text, not the face of the font, like Arial, or Courier. The editor works just like Microsoft Word, so to change the font of some text, highlight the text, and choose a new font or font size.

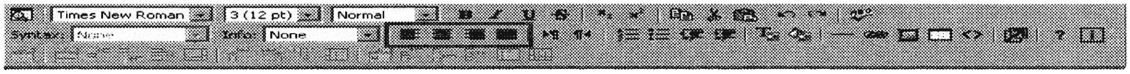


Next, we will talk a little about font decoration. Right next to the three menus mentioned above, there are buttons for bold, italic, underline and strikethrough. To make text bold, italic, underline or strikethrough, all you have to do is highlight some text, and click on the appropriate button. These four buttons work just like in Microsoft Word. Next to those are two more buttons for subscript and superscript, or text slightly below or above the line. These buttons also work just like in Microsoft Word.



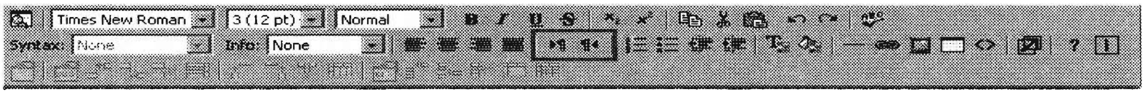
Times New Roman
3 (12 pt)
Normal
Syntax: None
Info: None

Next, we will learn how to align your text. On the second row of the toolbar, after the two drop-down menus, there are four buttons for left align, center align, right align, and justify. These buttons work just like in Microsoft Word, so you just select some text, click the appropriate button, and the text should be aligned properly.



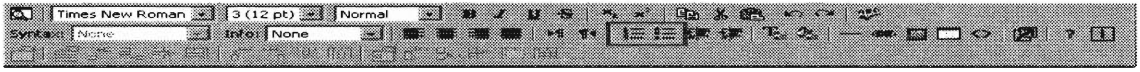
Times New Roman
3 (12 pt)
Normal
Syntax: None
Info: None

The next two buttons in the second row of the toolbar are for changing the text direction of your webpage. I wouldn't recommend using them as they can make your webpage difficult to read.



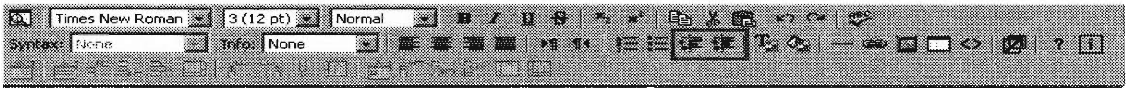
Times New Roman
3 (12 pt)
Normal
Syntax: None
Info: None

The next two buttons on row two are for creating bulleted and numbered lists. Simply click on one of them to activate them, and every time you type some text and hit 'enter', a new list bullet will be created, until you hit 'enter', and then 'backspace'.



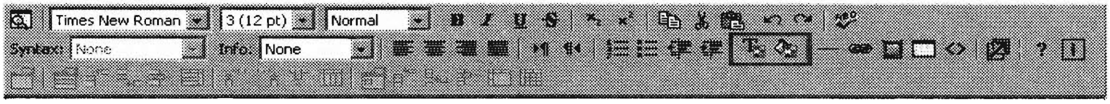
Times New Roman
3 (12 pt)
Normal
Syntax: None
Info: None

Directly to the right of the two list creation buttons are two buttons that control your text indentation. The one on the left will reduce the amount of indentation for your text when you click on it, and the one on the right will increase the amount of indentation for your text when you click on it.

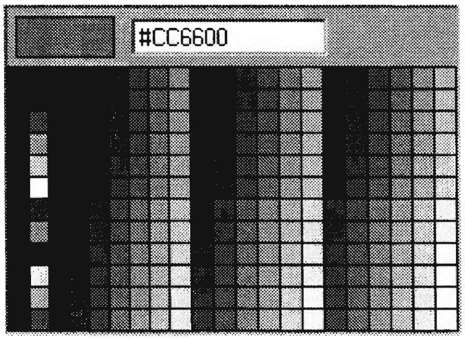


Times New Roman
3 (12 pt)
Normal
Syntax: None
Info: None

The next pair of buttons on the second toolbar row control your colors. The first one will control your text color, and the second one will control your text background color. Simply click on the button you want, and a new window will pop up with a bunch of different colored buttons. Click on the color you want, and the color in your document will be changed.

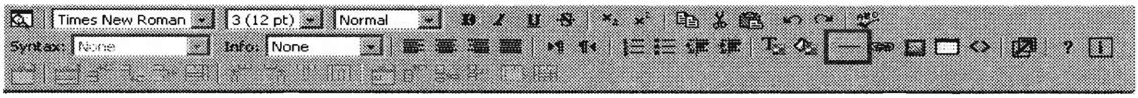


Times New Roman
3 (12 pt)
Normal
Syntax: None
Info: None



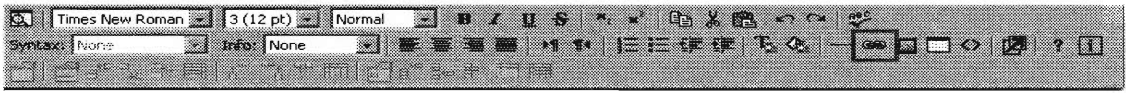
#CC6600

The next section of buttons on the second row of the toolbar is for adding HTML elements into your document. The first of the five buttons will add a horizontal rule (horizontal line divider) into your document wherever in the document your cursor is.

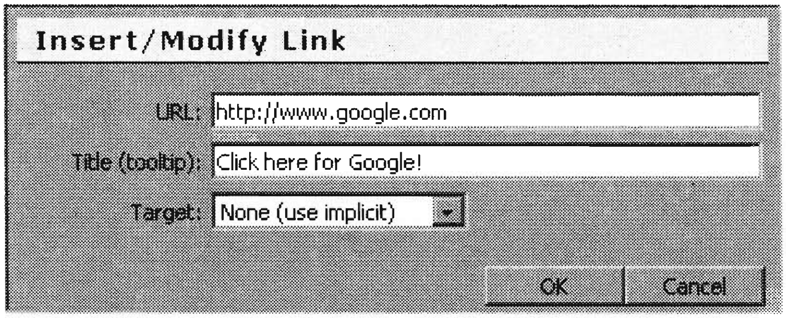


Times New Roman
3 (12 pt)
Normal
Syntax: None
Info: None

The second of these buttons is for adding web links into your document. When you click on this button, a smaller new window will open up and you will see something like the following picture. The two text fields you see are for the destination of this link, and the tooltip, which is a small bit of text that pops up if you hover your mouse over the link. The drop-down menu below these is where you choose the target for this link. Usually, you should leave it at its default option. To use the web link feature, highlight some text and then click the link button.



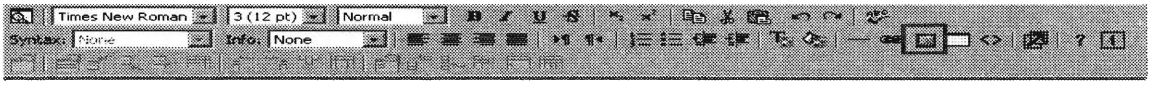
Times New Roman
3 (12 pt)
Normal
Syntax: None
Info: None



Insert/Modify Link

URL: http://www.google.com
Title (tooltip): Click here for Google!
Target: None (use implicit)

The next button in this section is for adding images into your document. Clicking on this button will bring up a new, smaller window like the one below. The first text field in this window is where you specify where to find this image file. Clicking the 'Preview' button next to it will show you a preview of the image in the big area at the bottom of the window. Below that text field is another text field which lets you specify what text will appear on the webpage if the image file you specify cannot be found. Finally, below that text field are some simple options for determining the layout of the image on the page, such as border thickness, spacing from the edge of text, and the alignment of the image.



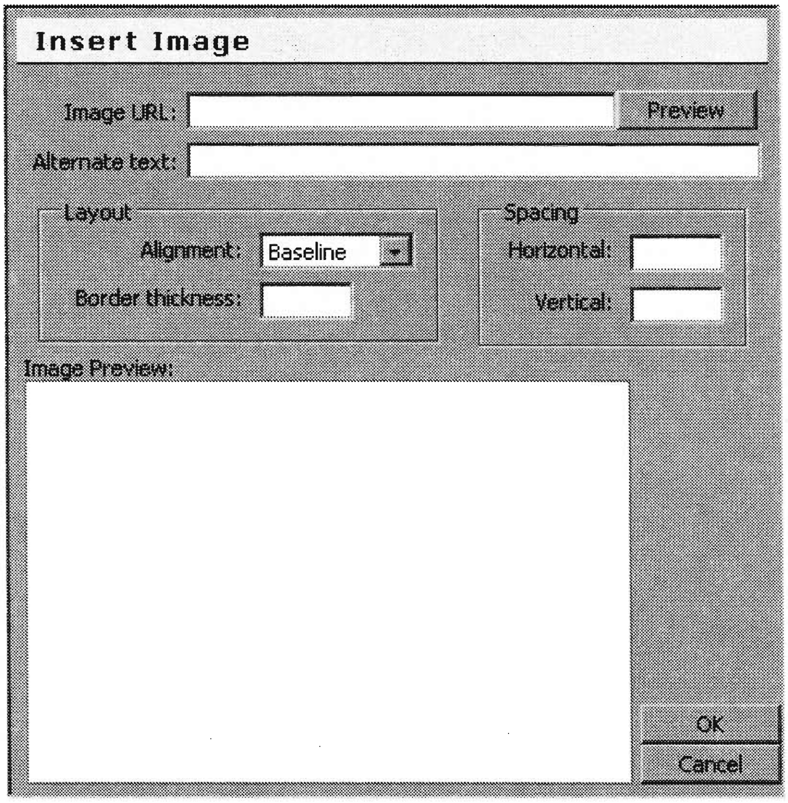
Times New Roman

3 (12 pt)

Normal

Syntax: None

Info: None



Insert Image

Image URL:

Alternate text:

Layout

Alignment: Baseline

Border thickness:

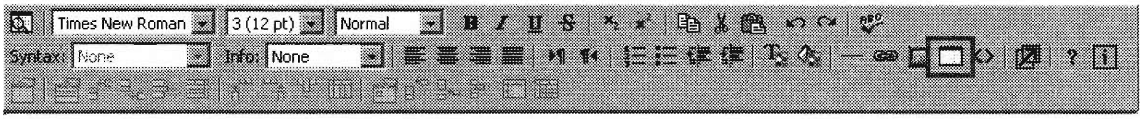
Spacing

Horizontal:

Vertical:

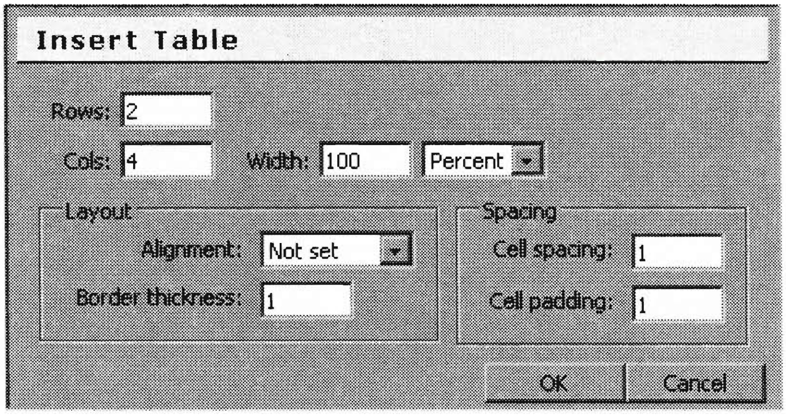
Image Preview:

Clicking on the fourth button of this five-button group will bring up a small new window with options for inserting a table into the document. At the top of this window are text fields where you can specify the number of rows and columns in the table. To the right of those fields is where you specify the width of the table, in pixels or percentage. Inside the box labeled 'layout' you can select how the table is aligned in the page as well as the thickness of the borders. To the right of that is where you can change how much space is between the cells of the table.



Times New Roman | 3 (12 pt) | Normal

Syntax: None | Info: None



Insert Table

Rows: 2

Cols: 4 Width: 100 Percent

Layout

Alignment: Not set

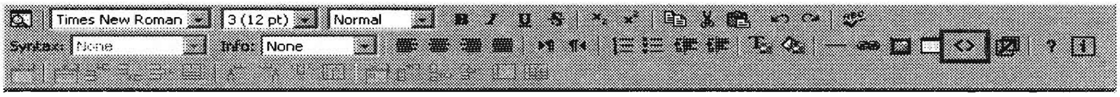
Border thickness: 1

Spacing

Cell spacing: 1

Cell padding: 1

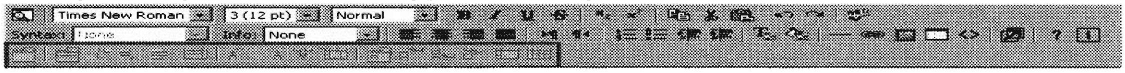
The fifth and final button in this group of buttons is the 'Toggle HTML source' button. This is for advanced users only. It toggles whether or not the HTML source code is shown, in case an advanced user wishes to edit the HTML code directly.



Times New Roman | 3 (12 pt) | Normal

Syntax: None | Info: None

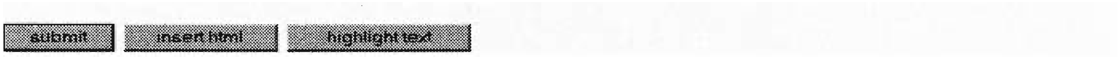
The bottom row of the toolbar is for advanced users only. Basically, they allow for advanced control of the tables on the page, and they aren't necessary for normal use. If you really feel the need to use them, hover your mouse cursor over the buttons, and a self-explanatory text blurb will appear next to your cursor.



Times New Roman | 3 (12 pt) | Normal

Syntax: None | Info: None

The third and final section of the editor page contains just three buttons. From left to right they are submit, insert html, and highlight text. The submit button is what you click to "save" your changes to the website when you are done. Please try not to save repeatedly because the system is designed so that when you "submit" your changes, an email is sent to your system administrator so they can accept or reject the changes. If you repeatedly submit your work, your system administrator will get flooded with emails. The middle button is for advanced users, who may want to insert their own HTML code into the editor, and the final button will make any text in the editor highlighted in yellow.



D-1

PROGRAMMERS GUIDE

SQL DATABASE TABLE INFORMATION
****

```
/**
 * holds user groups
 */

CREATE TABLE groups (
  id int(4) NOT NULL auto_increment,
  name varchar(30) default NULL,
  parent int(4) default NULL,
  type varchar(6) default NULL,
  UNIQUE KEY id (id)
) TYPE=MyISAM;


/**
 * holds user information
 */
CREATE TABLE users (
  id int(4) NOT NULL auto_increment,
  first varchar(30) default NULL,
  last varchar(30) default NULL,
  email varchar(256) default NULL,
  passwd varchar(50) default NULL,
  type varchar(6) default NULL,
  grp int(4) default NULL,
  UNIQUE KEY id (id)
) TYPE=MyISAM;


/**
 * holds entries in the menu and the group they belong too
 */
CREATE TABLE menu (
  name varchar(50) default NULL,
  loc varchar(8) default NULL,
  grp int(4) default NULL
) TYPE=MyISAM;


/**
 * holds contents of the pages referenced in the menu
 */
CREATE TABLE pages (
  loc varchar(8) default NULL,
  content text
) TYPE=MyISAM;


/**
 * temporarily holds saved edits to content
 */
CREATE TABLE save (
  id int(4) default NULL,
  loc varchar(8) default NULL,
  content text
) TYPE=MyISAM;


/**
 * holds edits of content waiting for approval
 */
CREATE TABLE temp_pages (
  loc varchar(8) default NULL,
  hash varchar(32) default NULL,
  content text,
  id int(4) default NULL
) TYPE=MyISAM;


***************************************
```

These are all of the table that make up the management system.

```
/**
*       Module:                 groups.php
*       Version:        2.0.0
*
*       Purpose:        allows people to edit and create groups in the user mgmt system
*
```

```
*       Author:                 Nick Byra & Robert Martin, 2005
*/

/*********************/
/***** Functions *****/
/*********************/



/**
*       function permissions()
*       sets up permissions
*/
permissions()


/**
*       function group_form( $num )
*       displays a form to edit/remove a group
*       @param $num -> the id # of the group
*/
group_form( $num )


/**
*       function parent_options()
*       adds the list of groups to the menu
*/
parent_options()


/**
*       function remove_group( $num )
*       removes the given group if it can be removed
*       @param $num -> the id # of the group to remove
*/
remove_group( $num )


/**
*       function add_group( $type, $name, $parent, $first, $last, $email, $passwd,
$confirm )
*       adds a group to the database
*       @param $type -> the type of group to add
*       @param $name -> the name of this group
*       @param $parent -> the parent group for this group
*       @param $first -> the owner's first name
*       @param $last -> the owner's last name
```

```
*	@param $email -> the owner's email address
*	@param $passwd -> the owner's password
*	@param $confirm -> confirm the password
*/
add_group( $type, $name, $parent, $first, $last, $email, $passwd, $confirm ) {
```

```
/**
*	Module:			index.php
*	Version:		2.0.0
*
*	Purpose:		displays the menu and content for the page selected
*
*
*	Author:			Nick Byra & Robert Martin, 2005
*/
```

```
/**
*	Module:			login.php
*	Version:		2.0.0
*
*	Purpose:		displays a user interface to log in to the system also
*					allows users to access the user mgmt & editing sections
*
*	Author:			Nick Byra & Robert Martin, 2005
*/


/*********************/
/***** Functions *****/
/*********************/


/**
*	function login( $name, $passwd, $id )
*	logs in to the system with the given name & password
*	@param $name -> the name to log in with
*	@param $passwd -> the password to log in with
*	@param $id -> id # of user if logged in currently
*	@return user id # on success, NULL on failure
*/
login( $name, $passwd, $id )
```

```
/**
*       Module:                 menu.php
*       Version:        2.0.0
*
*       Purpose:        allows users to edit the menu
*
*
*       Author:                 Nick Byra & Robert Martin, 2005
*/


/********************/
/***** Functions *****/
/********************/

/**
 * retreives menus or submenu data
 */
function side_menu($index)
```

```
/**
*       Module:                 rights.php
*       Version:        2.0.0
*
*       Purpose:        deals with editing content on the website
*
*
*       Author:                 Nick Byra & Robert Martin, 2005
*/
```

```
/**
*       Module:                 save.php
*       Version:        2.0.0
*
*       Purpose:        handles saving content and checking aproval
*
*       Author:                 Nick Byra & Robert Martin, 2005
*/
```

```
/**
*       Module:                 stlib.php
*       Version:        2.0.0
*
*       Purpose:        hold all the standard functions for the website
*
*       Author:                 Nick Byra & Robert Martin, 2005
*/

/*********************/
/***** Functions *****/
/*********************/


/**
 * print SQL error if there is one
 */
check_error($result)


/**
 * prints header data with title of the page
 */
wps_header($title)

/**
 * returns group id from group name
 */
function grp_from_name($name)

/**
 * returns group name from group id
 */
function grpname_from_id($id)

/**
 * returns highest menu location group has access too
 */
function high_node($id)

/**
 * determins if an id has rights to a location in the menu
 */
have_rights($id, $loc)

/**
 * returns group id for a menu location
 */
grp_from_page($loc)

/**
 * prints version info data
 */
version_info()

/**
 *       funtcion show_error( $err )
 *       prints out an error message
 *       @param $err -> the error msg to show
 */
show_error($err)

/**
 *       function boundary()
 *       draws a horizontal rule
 */
boundary()

/**
 * establish a connection to an SQL database
 */
connect_to_db()

/**
 * print account action functions
 */
account_actions()
```

```
/**
*       Module:                 user.php
*       Version:        2.0.0
*
*       Purpose:        allows editing and updating of the users in the system
*
*       Author:                 Nick Byra & Robert Martin, 2005
 */

/**
*       Module:                 users.php
*       Version:        2.0.0
*
```

```
*       Purpose:        allows editing and updating of the users in the system
*
*       Author:                 Nick Byra & Robert Martin, 2005
*/


/********************/
/***** Functions *****/
/********************/



/**
*       function permissions()
*       sets up user permissions
*/
permissions()

/**
*       function user_form( $num )
*       displays a form to edit/remove a user
*       @param $num -> the id # of the user
*/
user_form( $num )

/**
*       function remove_user( $num )
*       removes the user with id # = $num
*       @param $num -> id # of the user to remove
*/
remove_user( $num )

/**
*       function add_user( $type, $group, $first, $last, $email, $passwd, $confirm )
*       adds a user to the current group
*       @param $type -> the type of user this is
*       @param $group -> the group this user belongs to
*       @param $first -> the first name of this user
*       @param $last -> the last name of this user
*       @param $email -> the email address of this user
*       @param $passwd -> the passwd for this user
*       @param $confirm -> confirm the password
*/
add_user( $type, $group, $first, $last, $email, $passwd, $confirm )



/**
```

```
*	function update_user( $id , $first, $last, $email, $passwd, $confirm )
*	updates the user information for the specified user
*	@param $id -> the id # of the user to update
*	@param $first -> the first name of this user
*	@param $last -> the last name of this user
*	@param $email -> the email address of this user
*	@param $passwd -> the passwd for this user
*	@param $confirm -> confirm the password
*/
update_user( $id, $first, $last, $email, $passwd, $confirm )



/**
*	Module:			wps.php
*	Version:	2.0.0
*
*	Purpose:	generates menu structure
*
*	Author:			Nick Byra & Robert Martin, 2005
*/
/*********************/
/***** Functions *****/
/*********************/
/**
 *	funtcion gen_menu($index)
 *	recurcivly creates menus
 */
gen_menu($index)
```

References

Survey Ideas:

http://www.surveysystem.com/sdesign.htm

JavaScript Dropdown tutorial:

http://www.tutorialized.com/tutorial/Drop-Down-Menu-Tutorial/1361

Style Guide Reference:

http://www.useit.com/alertbox/designmistakes.html

http://www.ratz.com/features.html

http://www.useit.com/alertbox/9605.html

http://www.catb.org/~esr/html-hell.html