

Building Web Sites for Mathematics Courses: Some Answers to Notation Problems

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Abstract

Mathematics professors have struggled in the past with how to place documents containing mathematical symbols on their Web sites. This paper will address the use of both Mac and PC software for word processing, Web page authoring, and online course creation used by the presenters to produce mathematical documents and to publish them online.

Introduction

We have used our Web sites to enhance learning and instruction in our developmental studies mathematics courses. We have included syllabi, notes, and worksheets on these Web sites. Scott has incorporated notes, Microsoft PowerPoint presentations, interactive practice tests, and an interactive Microsoft Excel spread sheet for students to use to calculate their grades. Since the introduction of Blackboard CourseInfo software at Middle Tennessee State University last year, we have used this course management system for communication with students, to record grades, and to manage course information. Annette has begun using the CourseInfo site as her main Web site for her courses incorporating worksheets, and providing HyperStudio presentations and tutorials. Each of us (one PC user, one Mac user) has found ways to meet the challenges of publishing documents containing complex mathematical expressions online. So far, our courses have been Web-enhanced; however, Scott is now preparing to teach Elementary Algebra online.

Annette Williams, the Mac User

I am presently using a CourseInfo Web site to enhance my Elementary and Intermediate Algebra courses. This software enables an instructor to communicate with students through announcements easily posted on the Web site as well as through a ready-made

email distribution list. The software also allows HTML files to be published with little effort. I place worksheets, lecture notes, and HyperStudio files on the site for my students.

To prepare worksheets for publishing, I use Cooke Publications Mathwriter software to type the document. Unlike the usual word processing software, equations are typed along with the text within the MathWriter document without having to insert them as images. This is a quick way to create a worksheet. To create the HTML document, each page of the worksheet is individually selected and saved with the option "Save As A Picture" and pasted into an HTML document. Therefore, a three page worksheet would translate into one HTML document containing three GIF images. To place graphs into the Math Writer document, the graphing calculator on the Macintosh is used. Some drawings, such as triangles, are done with Microsoft Word or in HyperStudio and pasted into the MathWriter documents. HyperStudio has very easy to use drawing tools. When a page of the MathWriter file is copied as a picture and pasted into the HTML file, these graphs or drawings become part of that page's one GIF image. Saving each page as a separate image has made the documents print reliably for my students. The HTML document is created in Adobe PageMill. Each of these page images is a GIF file 8K to 16K in size.

The HTML file is loaded onto the CourseInfo site through the control panel by selecting "Add a Document" under the Assignments category. A browse option is offered to locate the file on the hard drive and when the submit button is pushed, it asked by file name for each GIF image giving a browse option to find each. This has been a very successful way to put mathematical materials into the students hands.

I also have many presentations created using HyperStudio software. These files have been made available on the CourseInfo site in two ways. The first way is to load them straight onto the site. Students are then prompted by the site to download the files. They can view the stacks by using HyperStudio Player, a free download from <http://www.hyperstudio.com>. The basic buttons used to navigate through the cards in the stack (the metaphor for this software) work, but some of the more advanced gimmicks do not.

The second way these files have been placed on the site is by copying and pasting each card in the stack separately into a PageMill document as the worksheets above were done. The advantage of this is that the students do not need to leave the site or have a viewer to see the notes. The drawbacks are that there is no navigation other than scrolling through the images, and of course, there are many GIF images for a large stack. Since the subject matter of these files is mathematics, the text is done in graphics mode rather than in a text box on the individual cards. It is easier to incorporate symbols that way. Some of the mathematical expressions were written with MathWriter then copied and pasted as a picture into the HyperStudio stacks. Text boxes would not copy as images from this application.

Examples of the worksheets and HyperStudio files can be viewed at <http://www.mtsu.edu/courseinfo>. See any of the my Intermediate Algebra sections and sign in as a guest.

Scott McDaniel, the PC user

The development of the Web site for both Elementary and Intermediate algebra has been an ongoing effort for the last 14 months. I began to take an interest in Web design in January 2000. Since then I have developed more than 400 pages for student use. These pages not only contain several detailed example problems but also interactive practice that gives students instant feedback. Getting math symbols on the Web can be a somewhat tedious task. However, with an elementary understanding of some basic software, one may publish and manage a fully functional Web site—one that is either there to enhance the class, or even a class that is totally online.

I use Microsoft FrontPage to publish and manage his site. Most of the documents are written in Microsoft Word, PowerPoint, and Excel. The Equation Editor that comes preinstalled in Word was used in earlier Web pages. Recently, though I have upgraded to Design Science Math Type (Equation Editor is a junior version of Math Type). This allows one to change the color of the equations and gives one more flexibility when creating documents with several math symbols. Currently, there is no effective way of expressing standard mathematical notation in Web pages. Equations can be displayed as GIF images but printing is poor, pages can download slowly, and they don't adapt to the browser user's font choices. One way to help speed up the process (in FrontPage) is to download and HTML filter to clean up the files once they are exported to the Web. This filter may be found at <http://officeupdate.microsoft.com/2000/downloadDetails/Msohtmf2.htm?s=/downloadCatalog/dldWord.asp>.

The program Winplot is used to get graphs on the Web. It may be downloaded for free at <http://math.exeter.edu/rparris/>. It is by far the easiest—certainly the cheapest—way to get basic graphs to the Web. It is easy to shade, color, and change the thickness of lines. An example may be found at http://www.mtsu.edu/~smcdanie/085_Spring_2001b/Chapter9/9_3&9_4quizanswers/Chapter9_3&9_4quizanswers.htm. If one desires more detailed plots, more sophisticated—and more expensive—computer algebra systems may be used with relatively no problems. If one requires students to use a graphing calculator, then placing screen shots on the Web is a must. Screen shots from the TI-83, which our department requires students to buy, can easily be captured with the TI-83 graph link. An example may be found at http://www.mtsu.edu/~smcdanie/085_Spring_2001b/TI_83_Help/Ch7_2/section_7_2_Graphing_lines.htm.
