An Example Web Site for Nuclear Engineering Education

How and Why

Abstract

The McMaster Nuclear Engineering website was constructed to provide a convenient place for students to get information on all matters relating to their studies and professional development, including course material, industry contacts, and reference material. This presentation addresses how the site was constructed and why it was constructed the way that it was. A key design criterion was that all delivery formats (lecture notes, handouts, course packs, web page information, etc.) should all flow directly from one document source (say an existing set of lecture notes) with the minimum of intervention or translation. Given the wide variation in formats (hand written notes, word processed documents, drawings, computer codes, etc), this is not a trivial requirement. Another key design criterion was that there be a smooth, incremental technology insertion path, that is, that the web augment the existing tools and techniques rather than force a replacement. This was essential since the focus of the instructor's efforts should be the content, not the delivery mechanism. A shareware html editor was used to create the overall web site structure and the pdf file format was adopted as the common platform for content delivery. With a modest amount of effort, a functional site that is easy to maintain was created.

prepared by: Wm. J. Garland, Professor
              Department of Engineering Physics
              McMaster University
              Hamilton, Ontario
              Canada
              Fall 1999

TABLE OF CONTENTS:

1   Introduction

1.1   What is needed for a learning environment for technical information and skills?

- a format for the material
- the material
- delivery

1.2   Material format

- graphical
  - concept maps
  - equations
  - plots
  - diagrams
  - illustrations

- text
  - to tell the story
  - give the details in a linear fashion

- instructors script
  - based on text

- activity for skill dev and evaluation
  - worked examples
  - problems
  - case studies
  - roleplay

1.3   The material

- text + scripts

- exercises

- evaluation

1.4   The delivery.

- Why lecture?
  - ○   common pace / basis for discussion
  - ○   story telling - people learn orally
  - ○   people like / need to be stroked, we are not machines
  - ○   hit the highlights / review
  - ○   dynamic response to questions
  - ○   vectoring
  - ○   non-linear
  - ○   the more high-tech is used, the more high-touch we need

- How can we enhance / replace the lecture?
  - ○   provide lecture notes
  - ○   CD-ROM
  - ○   Web
  - ○   Self study

1.5   What does this imply?

- needs vary with the situation and cost of material prep high
  - could spend your time on designing material and lectures and out source the conversion to the web based format

- would be good if we use one format of material for all delivery platforms

- need to protect our investment, thus...

- need an incremental growth path
  - can start with existing lecture material **with no changes**, scan it and post it on the web
  - gradually introduce features (email, links, simulations, sound, video ... as needed and as you are able.
  - Improve as you go - each improvement 'latches'

- time spent in learning the new technology needs to result in net overall savings
  - be careful - technology maintenance can be very time consuming.

- as always, there are great benefits in sharing instructional material / techniques

1.6   Where the web fits in

- the web offers a platform for
  - sharing
  - delivery
  - communication
  - distance learning
  - simulation and interaction
  - ...

- web format can be used offline
  - the browser interface is valid (CD-ROM, classroom lectures ...)
  - no material reformating is required
  - this is efficient and permits focussing effort and time on teaching, not technology

- this is important because the web offers a replacement / extension / revision of your existing way of doing business with
  - an incremental growth path
  - no loss of legacy material
  - no need to stop what you currently do and switch to a new mode overnight
  - no need to maintain old mode while developing new mode

2   Tools of the trade (How)

2.1   Overview

●   scary and overwhelming to the newbie

●   reality: you could be up and running in a few hours

●   an incremental approach is possible - learn as you go

●   what you need
  ○   browser
  ○   editor
  ○   server
  ○   pdf maker (optional)

2.2   The browser

- will likely become the new window on the world, even for your own computer

- plugins make it easy to view a variety of doc formats
  - html
  - graphics: gif, tif, jpeg
  - audio: wav...
  - video:
  - pdf
  - ...

- easy to share info
  - print
  - cut and paste
  - save to disk: code, exe, zip, ...

- quick look at a browser to show formats and sharing options

2.3   Html editor

- many available
  - raw html
  - wysiwyg

- Allaire HomeSite (raw html type)
  - works well, easy to get going
  - shareware award winner
  - great for those who like / need to know what is 'under the hood'
  - yields slim code
  - quick look at HomeSite operation

- MS frontpage (wysiwyg type)
  - works well, easy to get going
  - makes pretty sites
  - heavy handed, bloat code, encourages the use of graphics
  - tends to be slower loading for users

- Trellis
  - packaged with WP 9
  - offers automatic site management
  - obtuse and you lose contact with the raw html
  - not recommended

2.4   web server

● need to set up a machine that is a registered site

● machine OS has to have server capability
   ○ linux - appache
   ○ MS Win NT
   ○ Unix box

● need to set up read and write access to the server so you can upload your web site and maintain it

● let a tech do it -
   ○ each dept / faculty probably has a server.
   ○ CIS offers this service

● fussy and uninviting (ie intimidating) but this is a one time effort on your part
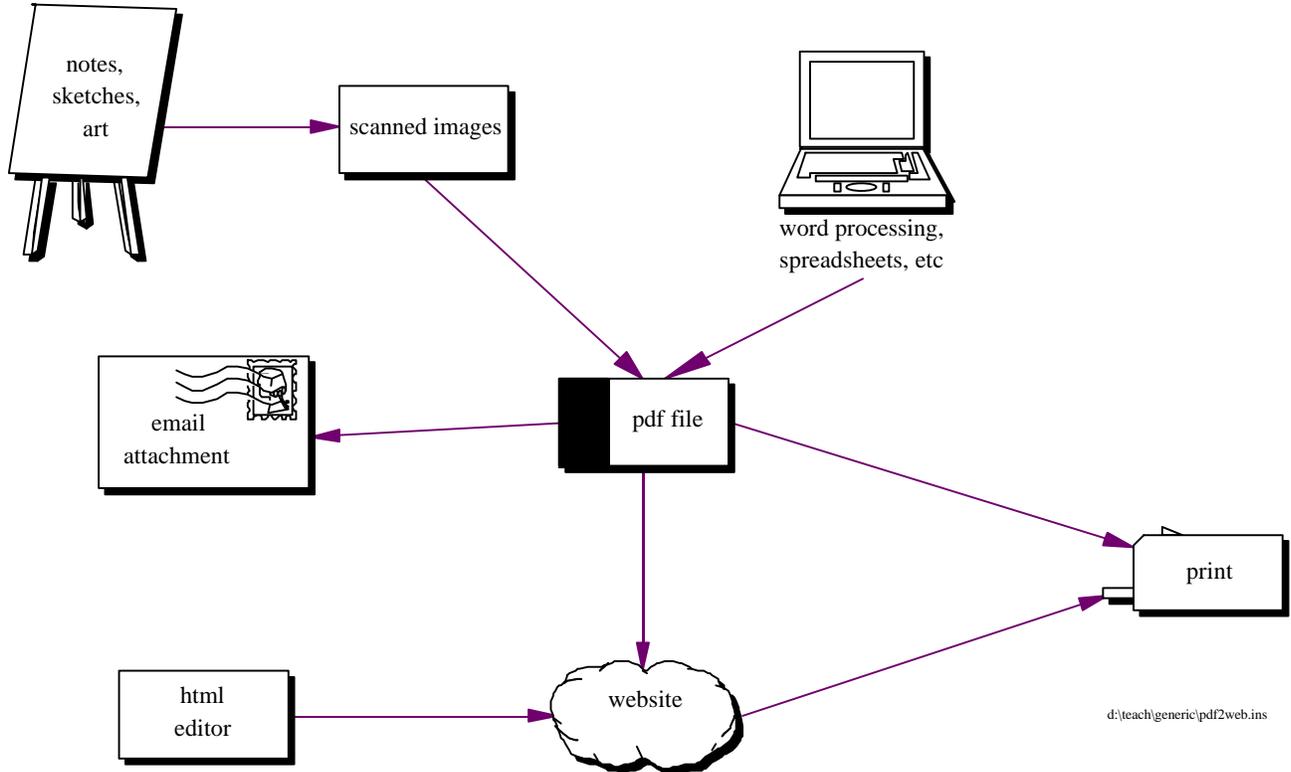
2.5   Acrobat

- Adobe Acrobat Reader
    - pdf file format
    - freely available and used by many - defacto standard
    - small compressed files that print nicely and display nicely if zoomed in
    - files cannot be altered
    - great way to share text and graphics such as course notes
    - quick look at Reader in operation

- Adobe Acrobat Writer
    - essentially a printer driver that produces pdf files
    - any application that prints can produce a printout can produce a pdf file with all formatting preserved
    - quick look at Writer as a printer driver

- Adobe Acrobat Exchange
    - essentially the Reader with some extra features such as
    - text touchup (very limited)
    - thumbnails and table of contents
    - insert and delete pages so you can combine pdf files
    - quick look at Exchange

2.6   From anything to pdf to web

!   writer sets itself up as a printer

!   any application that prints can create pdf

!   browsers can display pdf

notes, sketches, art → scanned images

word processing, spreadsheets, etc

email attachment ← pdf file → print

html editor → website → print

d:\teach\generic\pdf2web.ins

3   Design

3.1   Why does the site exist?

- Need to have a clear vision of what you need / want to achieve before proceeding
  - why are you doing this?
  - what do the students need / like?

- Need to consider your interest and ability
  - how interested in this are you?
  - what skills do you have?
  - what skills can you procure?

- Where is the payoff?
  - for the student
  - for you
  - for the dept / faculty / univ / profession

3.2   Matching the needs of the learner to the format

- screens too small and hard on the eyes
  - documents will be printed off, then read

- students need to annotate so hard copy is required anyway

- pdf format great for that

3.3   The most for the least

- Latching - do things that stick, ie, do once, use many
    - FAQ
    - reference info
    - etc

- build on what you have
    - scan existing docs -> pdf -> web page link

- focus on those things that give the most return for the least effort

- automate stuff you tend to do repeatedly that eats up you time
    - a few links to existing sites
    - an announcement section
    - reference info
    - schedules
    - start a FAQ

- if you use a course pack, put it on the web.
    - The bookstore will download it to make the pack
    - students can access it online and do electronic searches on it

- consider making a CD
    - there are campus services that will cut a CD directly from a website
    - or purchase a CD burner and make your own.
    - students are thus freed from slow web connections
    - good for the static info

- visit other sites and copy their html design - yes, it is legal and common / expected

3.4   KISS (Keep it Short and Simple)

- go easy on graphics

- keep the screen uncluttered

- plan for expansion to minimize future redesigns

- use a logical layout suited to the expected user level

- if possible, do not put the same content in more than one location
  - use a link instead

3.5   Frames and Menus

●   frames offer a convenient way to provide navigational aids / menus
- ○   to help the user maintain a context
- ○   help the user from getting lost
- ○   simplify site design and updating by putting common info in one spot

●   it is a bit more complicated to set up so use a site you link as an example

3.6   Limits of Html

●   very limited text formating

●   translation from word processors to html is not good (use pdf to compensate)

3.7   PDF

- convenient way to get all formats to the web

- not the best viewer unless running full screen

- great for info best printed and then read

- when used within a web page, can use the web page as a gross navigational aid and the

- pdf plugin for fine navigation
  - can pop in and out of pdf file without losing spot in file
  - can add toc and thumbnails to pdf file

4 Technology Insertion (Evolution)

4.1 Ground zero / baseline (chalk talk)

- the traditional format

- time honoured

- low tech - high touch in smaller classes

- dynamic response, etc as discussed previously

- desire to keep the benefits and compensate for the shortcomings

4.2   Word processing

- with the growth of the PC, our notes became tidier

- we could update and reprint easily

- cumbersome for sketching, equations, brainstorming, etc

- linear and stilted

- I find it more difficult to lecture from cf my handwritten notes

- notes can grow to replace text over time

4.3 Email

- great for out of class communication

- can eat up your time

- helps to level communication barriers for some

- allows time for considered questions and responses

- you have a record of what was said

- you can send out group mailings for announcements and for good points that come up from individual mailings

4.4   Web as a resource (passive)

- add links to your site to point to resources on the web

- add 'how-to' pages

- move lecture content that is fact based onto web pages for self-study

4.5 Web as a resource (active)

- add videos

- add simulations

- add code and other downloadable material

4.6   Web as a self-checking mechanism

- there is commercial software for automating this

- haven't investigated

4.7   Chat rooms

- Learn link, etc.

- requires more time and effort to set up

4.8   Instructor as a resource

- as the format evolves, the instructor is no longer centre stage

- instructor becomes just one of many resources to aid learning
  - instructor
  - text
  - lecture notes
  - web site
  - email
  - chat rooms
  - CD-ROM
  - simulations
  - etc

5   Efficient Preparation of Material

5.1   The issue

- Given a good source of material (say a text or detailed notes), need to prepare a script for lecturing
    - boring and useless to read from text in the classroom
    - can't find salient points on the fly

- May need to publish info in a variety of formats / platforms
    - handouts of key points
    - handouts of supporting material
    - lecture notes
    - web
    - CD-ROM

- If using more than one source of information
    - time consuming to prepare and maintain multiple sources
    - error prone
    - synchronisation problem

5.2   Things to note

● Students will not read lecture notes on-screen

● Thus adequate to use pdf for that

● If you have an electronic form for the lecture notes
  ○ you can use that in the class room instead of chalk talk
  ○ organize your document so that you can use the text / handouts / course pack as your overheads or script
  ○ need personal navigational aids to make it easy to skip over details and just hit the points you want to make in the lecture. Could use a colour bar to make the key slides visible in the thumbnails.
  ○ you could divide your text into transparencies + supporting text - and just use the transparencies in class
  ○ Use concept maps extensively and talk to them. You might be able to get away with lecturing mainly from them
  ○ use of a LCD projector is good if you want to demonstrate software, use animation, etc or simply to just teach from the web - setup of projector can be a problem / inconvenience
  ○ it is simpler to make overheads of at least your graphs, complicated diagrams, etc
  ○ don't make overheads of all the text pages - be selective / highlight

5.3   How to efficiently prepare material (one source)

- use web site for overall information organization
  - announcements
  - pdf docs for printing
  - assignments
  - solutions
  - any late breaking info / dynamic info
  - simulations
  - videos, etc

- prepare text and graphical info in your favourite application, complete with hyperlinks if desired as per above section is desired

- 'print' to pdf

- Optional - use exchange to make thumbnails

- Optional - use exchange addon to translate dead hyperlinks and toc in pdf to make live links and toc
  - can use FrameMaker to preserve your hyperlinks and toc in the source document
  - you don't want to have to manually recreate these links every time you revise a pdf file

- link pdf to web page

- make overheads, course packs, etc from this one source

6   Conclusions

6.1   Take the time to plan and design
●   Don't make vast plans based on half-vast ideas

6.2   Do the most for the least
●   Do things that latch

6.3   KISS

6.4   Use pdf

6.5   Grow into these new tools gradually (technology insertion)
●   Build on what you have already

6.6   Use one source for all deliveries if possible