Departmental Web sites: Function and Form

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From its inception, the World Wide Web (WWW) has always been a means of individual self-promotion. "Even though the web is hypermedia-based, the web is far from being a typical interface. From browsers to home pages, the web offers a plethora of 'individual interfaces' that are constantly in flux and designed by and for a diverse and far-reaching group."[1] And increasingly the Web is more than simply *another* medium of self-presentation; it is the only one. In particular, for entities such as universities, which unlike the television commercials of the corporate sector have no other viable means of self-presentation, the Web represents the only direct and useful avenue for dissemination of university-related information. Thus while the content of universities' and their departments' Web sites is often easy to procure, it is through the structured organization of that content, the user interface for that content, and the technology behind the user interface and delivery that the whole Web experience is created. It is not enough to have useful content; a site must have a useful and pleasing structure as well. It is the intent of this investigation to examine the unique tension that exists in departmental Web sites: specific function in combination with almost arbitrary form, resulting in a site that must represent the singular public face of a university department.

Project Description

The goal of this project was to gain a better understanding of academic Web site design, including aspects of user interface and layout, network performance, browser compatibility and technology, accessibility, and academy-specific objectives. In order to accomplish this goal, this investigation proposed to analyze 30 departmentally-oriented Web sites on two axes: 20 sites in a similar field from different universities and 10 sites

[1] Head, Alison J. (1997).

in differing fields from a single university. Wherever possible, these aspects would be compared to their non-academic counterparts, in both an objective and subject fashion.

In order to decide which sites would be included in the survey, the first question was which discipline to utilize as an exemplar. Having created two different departmental Web sites myself, I decided to use a field that I had had experience with both in its original scope as a graduate student and also in this functional capacity as a Web designer: Classics. Classics was also a very useful field to choose because it had no inherent technological component—quite the opposite! So a department's Web site would have no reason to be technologically advanced simply because the field itself is technological, unlike a Computer Science or Information Science site.

Having established Classics as my departmental axis, I researched and compiled a list of the top twenty Classics universities based on the nationally recognized Vanguard rankings[2]. In choosing the top twenty departments, the assumption is that these Web sites will be highly-frequented by interested students and faculty, at least in a relative sense.

The second axis would be differing departments on a single campus, the University of North Carolina at Chapel Hill (UNC-CH). This choice carried with it some interesting baggage, specifically the Carolina Computing Initiative (CCI). In 1997 and 1998, the late Chancellor Michael Hooker began funding large amounts of money into departmental projects. As a result of these investments, the diversity of these departmental systems led to Web standards being established in order to homogenize an otherwise diverse campus. University Web designers were encouraged to use of UNC colors and include links back to the UNC home page.

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[2] The Vanguard rankings are based on the National Research Council's faculty quality study of 1995. The rankings are determined by peer evaluation among faculty members at 274 universities and 3,600 programs. For further information, see http://www.jajnsn.com/vanguarduniversities/.

With the axes established, the final step was to establish criteria by which to judge these academic sites. A list of six major areas was established:

- *Departmental functions and content*, including listing of courses, faculty, schedules, contact information, and information timestamps.
- *User interface*, including navigation tools, the number of areas on the page, the use of white space, the complexity, consistency, and style of the site.
- *Disability access*, including ADA/Bobby compliance and alternate text options.
- *Linkage,* both internally to parent sites and externally to useful materials.
- *Networking issues,* including page size, download time, and number of graphics.
- *Web technology,* including server- and client-side scripting, stylesheets, advanced HTML, and frames.

While many of these criteria yield objective, numeric values, it is inevitable that the evaluation of areas such as user interface and the degree to which a site accomplishes its fundamental goals is largely subjective. Both types of data were recorded and analyzed as objectively as possible.

Analysis and Observations

Departmental functions and content. The areas chosen to be examined in this section include the functions and content which would categorize these sites as "departmental." The majority of these can be categorized as "meta-functions," above and beyond standard Web site functions: the listing of faculty; the listing of courses and curricula (both in the current semester and overall); and the listing of contact

information.[3] Also included in this section are the site timestamps, meant to indicate to the visitor how recently this departmental information has been revised.

For each of these areas, a scale of 1 to 5 was arbitrarily implemented, 1 being least satisfactory, 5 being most satisfactory. Zero (0) was also a possible score if the site did not address an area at all. Each site was examined by the investigator and each area was given a ranking on this scale.[4]

As an example of this scale, in the area of faculty listings, a site including a list of faculty names would score a 1. A site including names and email addresses would score a 2. A site including a single list of names, email, and some further information like general interests would score a 3. A site including the information of a 3-score along with some further information, including photos, particularly on a separate page, would score a 4. A site including all the previously mentioned information as well as the courses taught by the faculty member, his recent publications, and even a curriculum vitae would score a 5. In Appendices C through I, these individual site scores are recorded and the criteria for the individual scales are included. Appendix C specifically includes the results for departmental functions and content. Below is a table summarizing those results.

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[3] The scope of this study was kept rather tight so that comparisons could be made between a diverse number of "departmental" sites. As a result, the characteristics chosen for the study were not exhaustive. A more thorough study might better examine all possible facets of departmental sites, as well as examining multiple discipline-specific departmental sites. In order to reign in the size of this investigation, this approach was avoided, as it would have resulted in examination of a much larger number of sites (e.g., 200 sites for 10 disciplines at 20 top universities).

[4] Again, in a future implementation of this study, I would encourage the use of a polling audience who might visit these sites and answer these questions. Even with the 30 sites here, the number of individuals necessary to examine all sites and create a statistical balance is enormous and the task is time-consuming. Given a body of 500 to 1,000 people willing to examine one site each (a task which took a thorough 90 minutes on average for this investigator), an accurate statistical sampling would be more possible.

Departmental Functions	Courses	Faculty	Schedule	Contact	Time Stamp (%)
Classics Sites (20)	2.15	3.8	2.9	1.9	45
University of North Carolina (10)	**3.2**	**4.4**	2.8	2.4	20
Total Sites (30)	2.5	4	2.87	**2.07**	**36.7**

Figure 1. Departmental Functions Scoring

Overall these sites offer excellent faculty information: the average of 4 indicates that on average each site offered faculty names, contact information, biographical information, and often a photo. Less impressively, on average, the listings of departmental schedules and curricula are both adequate but not outstanding. In the case of the latter, numerous sites (9) have no course listings whatsoever and three other sites only utilize links to the university registrar's course listings.

These sites consistently offer enough information for a person to contact the department (a score of 2 indicates at least a mailing address is available on the site), but not much more than that: the standard deviation between scores in this category is just 0.64. Less consistently (36.7%) these sites offer users a revision timestamp by which a visitor might know how recently the site's information has been updated. Most UNC-CH sites actually offer a bit more contact information than this, often including a link to a campus map.

In examining these results, it is most noticeable that the UNC-CH sites consistently offer more information in the areas of course and faculty listings (and somewhat even in contact information). One explanation for this difference (though not the only one possible to be sure) may be the presence of a centralized information technology unit, in this case Academic Technology and Networking (ATN). The University offers Web development support to individuals and departments both via ATN's suggestions (http://www.unc.edu/template/) as well as other development units

which give advice and guidance to departmental Web site developers (e.g., the Office of Arts and Sciences Information Services, OASIS). While this general kind of support is nearly ubiquitous at universities around the country, it may simply the degree to which these units have made efforts to make their services clear and available at UNC-CH.

User interface. In Web site analysis there's probably nothing more obvious and thus more pertinent than user interface (UI). It is the first thing that we experience when we visit, no matter our original intent in visiting. It is also the means by which we navigate a site throughout a visit. It can even be argued that beyond all this, the UI is also an area that subconsciously affects the visitor's experience when visiting a site: it is often the nuances of the designer's UI choices that first influence with how much difficulty a visitor navigates a site and thus influences how fondly a visitor remembers a site. UI is at least equally important in the visitor's experience as is the actual content of a site.

Of the many possible UI areas, this investigation chose to examine a handful of pertinent design aspects: the complexity, consistency, and style of the site; the number of areas on the page; the amount of intentional white space; and the navigation tools presented to the visitor. Like the departmental functions, this analysis also utilizes a scale of 1 to 5 for such subjective areas as complexity, consistency, and style. The average results of these analyses are presented below in Figure 2; the complete results are available in Appendix D.

User Interface	Complexity	Consistency	Style	Areas	WS	NavBar
Classics Sites (20)	2.35	3.1	3.05	3.4	19	75
University of North Carolina (10)	**3.00**	**4.10**	**4.00**	5.20	22	90
Total Sites (30)	2.57	3.43	3.37	4.00	20	**80**

Figure 2. User Interface Scoring

Complexity here is defined as how intuitive (or rather counter-intuitive) the site is to understand and navigate. As subjective as this measurement can be, this investigation attempted to quantify it as reasonably as possible, on a scale of 1 (highly simple) to 5 (highly complex). On this scale, the complexity of the Classics sites is significantly less than that of the UNC-CH sites. On the whole, the Classics sites exhibit very simple interfaces (based on relatively simple non-tabular HTML code), whereas the UNC-CH sites are relatively complex, utilizing more "areas" on the page to display their information. While the UNC-CH sites have relatively different audiences being related to fields as different as English and Computer Science, the Classics sites have a more specific audience, one which is not necessarily as tolerant of a complex user interface. Yet the average complexity of all of the sites (2.57) still represents a rather clean interface, for a rather conservative audience of graduate students and professors. This lack of complexity is also borne out by the measurements of both white space (WS) and the number of different areas on the page: on average the departmental sites studied here utilized white space significantly while simultaneously attempting to limit the number of different areas the visitor must comprehend.

Equally significant in the results, both style (how distinctive and individual the site is) and consistency (how color and style are repeated throughout the site) are markedly different and relatively high among the Classics and UNC-CH sites. While the Classics sites are relatively stylized and consistent, the UNC-CH sites are even more stylized, though their interfaces are also more consistent. The major means by which a site can express its uniqueness is this style component and clearly while these departmental sites still cater to an audience which might prefer a cleaner interface, they

also wish to make an impression on their visitors. Equally important, however, is consistency within a given site; lack of consistency in color and design usually connotes a lack of professionalism. In this sense these departmental sites are no different from corporate Web sites: in order to maintain enrollment (a driving force behind university departments), the Web interface must remain as professional as the "human interface." At UNC-CH in particular, both style and consistency are even higher. In all probability this is directly related to the aforementioned support and guidance available to Web designers at UNC-CH. But more than UNC-CH's willingness to aide and embrace technology, the Classics sites are less likely to be using newer Web technologies to present their content (see *Web Technology* below) and therefore likely to seem less stylized and less consistent in relation to sites developed with more modern Web design and authoring technologies.

I would be remiss to ignore one facet of departmental Web sites that was nearly ubiquitous: the navigation bar. A navigation bar is not only indicative of good user interface, but more importantly it marks a site as having (and needing) intentional organization. The pieces of this site are intended to fit together in some fashion and a navigation bar offers an easy means of encapsulating these inter-referential pieces. In the majority of the sites studied, some sort of consistent means of navigation was almost always present (80%). While the designers of these Web sites differ in their approach to complexity, style, and consistency, nearly all of them have chosen to include some sort of tool for accessing the varying areas of the site. Furthermore, the inclusion of a navigation bar indicates not only forethought, but also relational (if not often hierarchical) structure: instead of slapping all pertinent content on a single page (as is often the case with personal Web sites), these designers intentionally decided to break up their information

into pieces more manageable both for the original designer to encode and for the newly arrived visitor to ingest. More than any other aspect of the UI of these departmental Web sites, the inclusion of the navigation bar signifies the conscious need to control the flow and presentation of content: it signifies intentional instead of haphazard decision-making and site design.

Disability Access. This section is an important, if relatively new, area of Web development. While the Americans with Disabilities Act (ADA) is older than the Web itself, the specter of ADA compliance has only become important in the past few years. Taking into account how important the Web has become in our everyday lives, from breaking news information to stock transactions to online bill-paying to tax filing, it became very clear that a gap existed between the capable and the handicapped, a gap that was only widening on the Web. Specifically, many Web sites use HTML in ways that were unforeseen and certainly unintended. This includes, though it is by no means limited to, the use of content-driven markup to create page style and layout (e.g., the use of HTML tables to create graphical user interfaces). While such "recasting" of Web structures has driven the growth of the WWW to this day, emergent technologies like cascading stylesheets (CSS) and extensible markup language (XML) require that designers re-examine the separate roles of style and content, particularly in the face of more stringent enforcement of the ADA. In particular, at UNC-CH the Center for Instructional Technology has recently reminded its constituency of the need for ADA compliance and has offered assistance in addressing the issue.[5]

[5] CITations #35, October 20, 2000.

Disability Access	Bobby Level 1 (%)	Bobby Level 2 (%)	Bobby Level 3 (%)	Text-only version (%)
Classics Sites (20)	10	0	0	5
University of North Carolina (10)	30	0	0	10
Total Sites (30)	**16.67**	0	0	**6.67**

Figure 3. Disability Access Scoring

As implied by the results of this limited survey, the Web has yet to embrace ADA compliance. Even under federal mandate that "state, local governments and the business sector must provide effective communication whenever they communicate through the Internet," only 16.7% of these departmental sites had even basic compliance with baseline standards.[6] Similarly disturbing, only 6.7% of sites offered a text-only version in order to allow the disabled equal access to the site's information.[7] While disability access is a relatively new issue for site designers to address (and often retrofit existent sites for), being a federal law it is neither ephemeral nor a trifle: it cannot and must not be ignored by Web designers. Yet it is clear from just this brief examination that Web site designers at major universities around the country are negligent, even with the assistance and admonition of information specialists. This is partly due to the current habits of Web designers, established before ADA compliance was necessary; and it is also due to the inherent laxity of most HTML coding programs, which do not force the user to include

[6] *Bobby* (http://www.cast.org/bobby) is the program which was used to judge these sites in reference to disability standards. Priority levels of Bobby compliance are determined by various factors, though the simplest of these is that all imagery on a given site have alternate text in order that a page-reader for the blind can interpret the page's content. This Priority 1 compliance is a bare minimum for ADA compliance, while Priorities 2 and 3 are encouraged but not absolutely necessary for sufficient disability access.

[7] It should be noted that two UNC-CH sites (the School of Education and the School of Information and Library Science) each offer "text-only" links from their initial home pages. And while these links do present a visitor with a text-only mirror of the initial page, upon accessing any of these "mirror" links, the visitor is sent to the same non-ADA-compliant page that he would have found when clicking on the link from the initial page itself. This *cannot* be considered a text-only alternative!

ALT tagging on IMG tags and do not require (or assist) the user to produce text-only versions of each page created.

Linkage. The next area examined in the study was hypertextual linkage, or more simply "how connected a given departmental site was to its parents and peers." One of the most useful and revolutionary aspects of the Web is its ability to interconnect documents on many different levels. Without hypertext, we could not "surf" the Web. And just as important as local content in evaluating a Web site, one cannot neglect the information made available by linking to related sites. There is indeed only a simple semantic difference what one publishes himself and what one links to which is published by others: in publishing material on one's own site, an explicit trust is created; when linking to material on an external site, there is an implicit trust of value nearly equal to that of publishing the material oneself (unless specifically noted otherwise). Part of the idea of the Web is the creation of authority and the reduction of redundancy, so that if I trust that a given site offers a satisfactory discussion of a given topic, instead of either copying that material directly (i.e. plagiarizing) and then having to maintain the duplicated material, I can simply link to the authority site.

Furthermore, I can also gain internal trust through external linkage. Specifically, by linking to a parent site (e.g. the UNC-CH home page) from a departmental site, the visitor is given a reassurance that this site is indeed a branch of the major institution. Instead of transferring authority actively via an external link from the department to the trusted authority, this transfer works in reverse: the authority of the original site is increased by the inclusion of a link to its more recognizable parent. This parental linkage

also creates an internetwork between the institution's child sites (departments) and their parent (university) without requiring that the children use a particular navigation bar or template.

Linkage	Parent (%)	Top-Level (%)	External (%)
Classics Sites (20)	35	65	**90**
University of North Carolina (10)	**70**	**80**	20
Total Sites (30)	46.7	70	66.7

Figure 4. Linkage Scoring

It is interesting to note that there is a strong division along the two axes in this particular area of investigation. While the Classics sites are much more externally oriented in their linkage, the UNC-CH sites investigated are quite the opposite: they have very high parental linkage with very little external linkage. I must speculate that part of this disparity may be a direct result of computer issues faced by Classicists. Indeed, the fact that 18 of the 20 of these Classics sites surveyed include a page of links to other Classics sites is probably directly related to the complexity that arises from reading and publishing in another language. The number of Classical fonts alone is staggering! With the inclusion of broad areas beyond the language itself, like Classical Archaeology, Social History, and Linguistics, two things become abundantly clear about Classics on the Web: it encompasses quite a bit of information; and there is so much information that no one person can be expected to organize it all.[8] The high amount of linkage from Classics sites to other Classics sites might best be explained as such.

[8] Some of the very first and still most utilized Classics sites on the Internet are repositories for links and reference materials, such as the meta-index Classics Alcove (http://web.uflib.ufl.edu/cm/classics/), established in the early 1990s.

While it is difficult to explain why only 2 of the 10 UNC-CH sites include a collection of external references, the internal orientation of these sites may be a bit easier to explain. Again, the UNC-CH Web space has been guided toward homogenization since the late 1990s, mostly through the establishment of guidelines and the assistance of information specialists. As a standard practice, linkage to a parent site (e.g., a college) and to the top-level site (e.g., the university) has been healthily encouraged in Web development at UNC-CH. The average top-level linkage of 65% exhibited by the Classics sites seems to be a better indicator of general university trends across the country, where support and guidelines are not necessarily available.

Networking issues. Though many Internet users are giving up their old modems for broadband Internet access, the majority must still dial the phone in order to access the Web.[9] When designing public Web sites such as these, considerations of total download time, page size, and number of graphics are not trivial. Jakob Nielsen concludes that for the lowest common denominator (modem users) page size should preferably be just 2 kilobytes, though a page size of up to 34 kilobytes is still acceptable in retaining a visitor's attention.[10] As Nielsen pointed out in 1998, "even though high-end users may have ISDN these days, Web design must aim at optimal usability over a 28.8 kbps modem."[11] The issue is indeed as much one of attention span as it is one of bandwidth: in

[9] As of December 2000, high-speed, broadband access could claim only 12% of the at-home market (Pastore, 2001).
[10] Nielsen (March 1997) argues that in order for the user to feel a sense of flow through the Web space, there should be a minimum one-second response time from a Web site. And in order that the user not give up and go on to some other task, there *must* be at least a ten-second response time. These page sizes are derived from those observations.
[11] Nielsen, April 1998.

order to keep a visitor interested in the page, it should be downloaded in a reasonable amount of time.

Networking Issues	Graphics	Size (KB)	Time (s)
Classics Sites (20)	5.40	47.29	16.56
University of North Carolina (10)	7.90	**70.17**	25.14
Total Sites (30)	6.23	54.92	19.42

Figure 5. Networking Issues Scoring[12]

While the use of graphics is relatively small for all departmental sites investigated, the size of these departmental home pages is over *double* Nielsen's recommended bottom line. On average it would take nearly 20 seconds on a 28.8 Kbps modem to download a given site's initial page—hardly the fast response Nielsen demands. This is the direct and somewhat unfortunate side-effect of the network location of all of these departments. They all connect to the Internet over high-speed connections, so it becomes very difficult to judge just how long these pages might take to download on a slower device. While this is certainly not an issue among colleagues who might most often access these departmental sites from their high-speed office connections, the major division that is promulgated is between the bandwidth have's and have-not's. This division of those who can and cannot access this information with regularity is no less serious than the wider "information divide" created by the Internet itself.

The two most basic components of the Internet are the computers and the network between them. If either one of these is lacking or hindered, such a division will naturally arise. While it may seem trivial that the 28.8 baud modem user cannot access the

[12] The *Time* field displayed in this table is an estimate of how long the page would take to download on a 28.8Kbps modem. In order to estimate the 56Kbps download times, you can safely divide these values by two.

University of Wisconsin Department of Classics' Web site, this is symptomatic of this larger problem created by the Internet. We are creating a new information-centered world and we are willingly keeping a significant proportion of the population out of it.[13]

Web technology. The final area of examination in the study was how much and what types of Web-centered technologies these departmental sites are using in delivering their content. While numerous and diverse technologies currently exist to assist in publishing Web materials, this survey was intentionally limited to these general categories: server-side scripting, client-side scripting, frames, stylesheets, and the use of advanced HTML. The utilization of these advanced technologies often creates a direct dichotomy with universal Web access. For example, the inclusion of advanced HTML requires a newer browser, thus limiting the possible audience. On the other hand, the implementation of server-side scripting often allows detection of older browsers, delivering properly formatted content to particular browsers, enhancing universal access. Thus by identifying the technology implemented on these departmental sites we can both date the site's inception and possibly theorize its intended audience (or at least their technology).

Web Technology	Server (%)	Client (%)	Style (%)	HTML4 (%)	Frames (%)
Classics Sites (20)	**10**	40	25	5	**25**
University of North Carolina (10)	30	50	30	0	0
Total Sites (30)	16.67	**43.33**	**26.67**	**3.33**	16.67

Figure 6. Web Technology Scoring

[13] A significant government study on the "information divide" was published as early as 1995 when then Secretary of Commerce Ron Brown published "Falling through the Net." A follow-up report was produced in 1998 by McConnaughey and Lader. Elory Rozner also addressed this issue that same year with "Haves, Have-Nots, and Have-to-Haves: Net Effects of the Digital Divide." The Gartner Group has directly addressed this newer "bandwidth divide" in September 2000.

In stark contrast to the UNC-CH sites, the Classics departmental sites do not use very much server-side scripting (only 2 of 20 sites) and do use frames (5 of 20 sites). Both of these characteristics are indicative of older sites, created before server-side scripting was prevalent and when frames were a popular means of establishing navigation tools. In fact, server-side scripting more than any other technology has specifically made frames obsolete. In particular, frames by their nature as multiple pages are not ADA-compliant and have thus been generally discouraged in current Web development. In fact, Jakob Nielsen believes that frames "break the fundamental user model of the web page."[14] The fact that a significant minority departmental Web sites are still using this deprecated technology indicates that Web development is not being directed by university-level standards or guidelines: these individual departments are responsible for site development and implementation. A major step toward ADA-compliance could easily be accomplished by centralizing these services and requiring minimum standards.[15]

One of every two of these departmental sites, both at UNC-CH and beyond, uses client-side scripting to aid in delivery of their information (always JavaScript). While generally there is no actual information conveyed through the scripting: it is mostly used for "mouseover" cosmetic effects like highlights. While this is an indication that these sites are using newer technology, the use of client-side scripting brings with it further access issues: first and most obviously, client-side scripting which delivers information is not ADA-compliant, but equally important is the limitation on browsers which cannot read client-side scripting (early versions of Netscape Navigator and Microsoft Internet

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[14] Nielsen, Jakob. (May 1996).

[15] Centralized services would also allow the implementation of more server-side scripting and database back-ends, allowing departments to concentrate more on content, less on delivery and design—indeed the realm of IT professionals, not departments. And centralized server-side scripting would also better homogenize important issues like inter-linkage between departmental sites and their parental sites.

Explorer as well as text-only browsers like Lynx). Client-side scripting, while more user-friendly when it works, does not allow for universal access.

More recently emerging technologies, stylesheets and advanced HTML, are in much less use on these departmental sites generally. While both stylesheets and advanced HTML are becoming more widely supported in newer browsers, only the former is being accepted by departmental sites on any significant scale. This certainly has everything to do with these departmental sites trying to reach a wider audience. The emergent HTML technologies are usually initially available in only one of the two major browsers, or else implemented differently in each browser; stylesheets are more standardized in the most recent browser versions, so one can expect that the results will look similar in both Netscape 6 and Internet Explorer 6. But of course, this requires that your constituency use those browsers to obtain the proper effect. Thus, the rising use of stylesheets and the negligible presence of advanced HTML, in combination with the major use of client-side scripting, indicates that the developers of these Web sites most likely tested these departmental sites against only two browsers, and in fact specifically the latest releases of those browsers. While this is standard Web development practice, it is hardly justifiable considering the large and diverse base of visitors these departmental sites are intended to reach. Indeed, as a bare minimum, tests for ADA-compliance as well as text-based browsers should be included in departmental Web site development.

Conclusion

The group of sites surveyed in this project, while limited, has offered some insight into the function and form of departmental Web sites. On the whole the sites have large

amounts of content to format and deliver, and their interfaces are relatively simple and somewhat stylized, rejecting more recent Web technologies. But if their basic goal is to offer departmental information (courses, faculty, contacts, etc.) to a wide audience, the intent fails not due to lack of content, which is usually rich, but largely due to technologically-imposed limitations on access.

The Classics departmental sites generally seem simpler stylistically but somewhat out-of-date technologically, which is both a blessing and a curse: the unfortunate retention of deprecated technologies such as frames makes these sites rather inaccessible to a small but significant group of the population. But the relatively simple layout of these Classics sites, in combination with the prevalence of navigation tools, not only indicates an attempt to streamline a visitor's experience, but from a design point of view it may also allow easier transition to a frameless environment at some future date.

The UNC-CH sites on the other hand, while a bit more complex, were also better interconnected to their parental sites and better homogenized stylistically. Part of this style and consistency derives from these sites better embracing new technologies, in particular server-side scripting along with the abandonment of frames. One might hope to see similar homogeneity on other university campuses as well, being driven by Web guidelines in conjunction with the assistance of information technology professionals at the institution. The UNC-CH sites benefit from this investment above all else.

Still, there remain major problems exhibited by nearly all of these sites: ADA compliance and page size. While both content and general delivery are well-addressed by these departmental Web sites, very few of them can offer information to users with disabilities. Until that major issue is addressed, not only will these departmental sites

remain in defiance of federal law, they will not allow their information to reach the widest possible audience and ipso facto they will not obtain the best possible graduate students and faculty. Similarly, until these sites accommodate users with less bandwidth, which remains the large majority of Internet users even today, again they will not reach the widest possible audience, and again certain otherwise interested people will not connect with the department in any significant way. As pioneers of both the Internet and Education, universities and their departmental Web sites have a responsibility to address these issues, to provide universal access, to bridge these "digital divides."

Recommendations for Further Study

While this study of departmental Web sites is certainly revealing, there are important aspects of it that remain largely subjective, and specifically subjective to a single investigator's assessments. In analyzing both content and user interface, it is largely impossible to gather entirely objective data. But by polling a statistically significant number of people and averaging those scores, the investigation might reflect a more universal assessment of these areas.

There are also other aspects of departmental Web site development and usefulness that became interesting in light of the assessment of these sites. Most importantly, it would be very useful to have a control group of Web sites which are not departmental. In fact, a direct comparison of the data gathered here and that which might be gathered from personal as well as corporate Web sites would prove very interesting. With the current data, one can make comparative statements either very generally between the data and general Web site characteristics or more specifically between the two axes of the study.

Beyond this control group, I believe it would also be fruitful to add a number of different disciplines to this study, creating a plane of sites with the original two axes remaining discipline and universities. A matrix of 15 disciplines across 15 universities would allow the possibility of comparison of both university policy and otherwise-invisible discipline-specific characteristics. A matrix of this size would be very dense (225 total sites) but would yield a much more accurate study. In addition to this matrix, the employment of multiple site reviewers to examine the more subjective aspects of the sites (content and user interface) would also yield much more accurate and scientifically acceptable results.

Other specific parameters that might be worthy of a more intensive study include the responsiveness of the site manager (i.e. how quickly do the sites reply to visitor-submitted questions, if that is even possible). Also, in this test of responsiveness, an investigator might ask specifically what tools were used in the creation of the site, in order to gain a better and more precise understanding of the involved technology. One might also examine site traffic and track site change over time, taking "snapshots" of the site over time and examining the number and types of site changes.

For its relative simplicity and subjective tendencies, the investigation did yield some valuable data concerning the nature and execution of departmental Web sites. While there is an abundance of possible content (and therefore an inherent structure to Web layout), the execution often results in simple sites produced with simple Web technologies, sites that reach a majority of intended users though do leave out important clusters of visitors. A more extensive and scientific survey can offer incontrovertible

evidence, forcing departmental sites to acknowledge a broader audience and comply with standards, both local to the university and federal.

Appendix A: Vanguard Rankings and the Top Twenty Classics Departments

Universities	Site URL	Vanguard Ranking
Harvard University	http://www.fas.harvard.edu/~classics/	1
University of California, Berkeley	http://ls.berkeley.edu/dept/classics/	2
University of Michigan	http://www.umich.edu/~classics/	3
Princeton University	http://www.princeton.edu/~classics/	4
Yale University	http://www.yale.edu/classics/	5
Brown University	http://www.brown.edu/Departments/Classics/	6
University of Chicago	http://humanities.uchicago.edu/classics/	7
University of Texas at Austin	http://www.utexas.edu/depts/classics/	8
University of California, Los Angeles	http://www.humnet.ucla.edu/humnet/classics/	9
Columbia University	http://www.columbia.edu/cu/classics/	10
University of North Carolina at Chapel Hill	http://classics.unc.edu/	11
Cornell University	http://www.arts.cornell.edu/classics/	12
University of Pennsylvania	http://ccat.sas.upenn.edu/clst/	13
Bryn Mawr College	http://www.brynmawr.edu/Acads/Langs/classics/	14
Duke University	http://www.duke.edu/web/classics/	15
Stanford University	http://www.stanford.edu/dept/classics/	16
University of Illinois, Urbana-Champaign	http://www.classics.uiuc.edu/	17
University of Virginia	http://www.virginia.edu/~classics/	18
University of Wisconsin, Madison	http://classics.lss.wisc.edu/	19
University of Washington	http://depts.washington.edu/clasdept/	20

Appendix B: Sites Chosen from the University of North Carolina at Chapel Hill

Schools/Departments	Site URL	Vanguard Ranking
School of Education	http://www.unc.edu/depts/ed/	N/A
School of Information and Library Science	http://www.ils.unc.edu/	N/A
School of Law	http://www.law.unc.edu/	N/A
School of Medicine	http://www.med.unc.edu/	N/A
School of Journalism and Mass Communication	http://www.ibiblio.org/jomc/	N/A
Department of Art	http://www.unc.edu/depts/art/	32
Department of Computer Science	http://www.cs.unc.edu/	29
Department of English	http://www.unc.edu/depts/english/	24
Department of Physics and Astronomy	http://www.physics.unc.edu/	53
Department of Sociology	http://www.unc.edu/depts/soc/	6

Appendix C: Departmental Functions and Content Scoring

Classics Sites	Courses	Faculty	Schedule	Contact	Stamp
Harvard University	0	5	1	1	11/6/01
University of California, Berkeley	0	3	4	3	
University of Michigan	0	3	0	3	
Princeton University	3	3	4	2	
Yale University	3	3	4	2	
Brown University	3	2	3	1	
University of Chicago	5	5	0	2	
University of Texas at Austin	5	3	4	2	9/6/01
University of California, Los Angeles	0	5	0	2	5/16/00
Columbia University	1	3	0	2	10/1/01
University of North Carolina at Chapel Hill	5	5	5	2	11/21/01
Cornell University	4	5	5	2	8/9/01
University of Pennsylvania	5	4	5	2	11/30/01
Bryn Mawr College	0	4	0	0	
Duke University	1	5	2	2	
Stanford University	0	5	4	2	12/2/01
University of Illinois, Urbana-Champaign	2	2	5	2	
University of Virginia	1	5	4	2	
University of Wisconsin, Madison	3	4	5	2	
University of Washington	2	2	3	2	10/26/01
University of North Carolina Sites	Courses	Faculty	Schedule	Contact	Stamp
School of Education	2	5	1	2	
School of Information and Library Science	5	5	5	3	
School of Law	0	5	3	2	
School of Medicine	3	2	4	3	
School of Journalism and Mass Comm.	5	4	2	3	
Department of Art	0	3	1	2	
Department of Computer Science	5	5	3	3	11/12/01
Department of English	4	5	3	2	11/21/01
Department of Physics and Astronomy	5	5	3	2	
Department of Sociology	3	5	3	2	
Averages	Courses	Faculty	Schedule	Contact	Stamp (%)
Classics Sites (20)	2.15	3.8	2.9	1.9	45
University of North Carolina (10)	3.2	4.4	2.8	2.4	20
Total Sites (30)	2.5	4	2.87	2.07	36.7

Appendix C-1: Criteria for Evaluating Departmental Functions and Content

Courses	**Does the site list general courses and curricula?**
0	no courses listed, no links offered
1	link to university registrar
2	minimal listing of courses on department site
3	courses and brief descriptions listed on department site
4	courses and descriptions listed, as well as links to course Web pages
5	courses listed with descriptions and links along with further information
Faculty	**Does the site list departmental faculty members?**
0	no faculty listed
1	faculty names listed
2	faculty contact information listed
3	single list of names, email, and some further information like general interests
4	3-score plus some further information, including photos, possibly a separate page
5	4-score plus courses taught, recent publications, and even a curriculum vitae
Schedule	Does the site include a schedule of events and classes for the current semester?
0	no schedule
1	limited schedule, possibly out-of-date
2	basic schedule of classes
3	schedule of classes with descriptive and location information
4	3-score plus information on other departmental events
5	4-score plus links to general descriptions
Contact	Does the site offer contact information?
0	no contact information
1	general location on campus (i.e. building name)
2	mailing address
3	inclusion of a map
4	above and beyond a 3-score
Stamp	Does the site present a revision timestamp, indicating when it was last updated?

Appendix D: User Interface Scoring

Classics Sites	Complexity	Consistency	Style
Harvard University	2	4	3
University of California, Berkeley	3	3	2
University of Michigan	2	1	1
Princeton University	4	4	4
Yale University	3	3	3
Brown University	2	4	4
University of Chicago	2	2	2
University of Texas at Austin	4	3	5
University of California, Los Angeles	2	2	2
Columbia University	4	4	5
University of North Carolina at Chapel Hill	2	5	5
Cornell University	1	1	1
University of Pennsylvania	1	3	2
Bryn Mawr College	1	4	3
Duke University	2	5	4
Stanford University	4	5	5
University of Illinois, Urbana-Champaign	3	3	3
University of Virginia	2	3	3
University of Wisconsin, Madison	2	1	2
University of Washington	1	2	2
University of North Carolina Sites	Complexity	Consistency	Style
School of Education	3	4	4
School of Information and Library Science	4	4	4
School of Law	3	5	5
School of Medicine	3	5	4
School of Journalism and Mass Comm.	3	5	4
Department of Art	3	3	4
Department of Computer Science	3	3	4
Department of English	4	5	4
Department of Physics and Astronomy	2	4	5
Department of Sociology	2	3	2
Averages	Complexity	Consistency	Style
Classics Sites (20)	2.35	3.1	3.05
University of North Carolina (10)	3.00	4.10	4.00
Total Sites (30)	2.57	3.43	3.37

Complexity = How complex is the site? (1 simple; 5 highly complex)
Consistency = How consistent are color, font, and layout across the site? (1 highly inconsistent; 5 highly consistent)
Style = How stylized is the site? (1 very little style; 5 very highly stylized)

Appendix D: User Interface Scoring (continued)

Classics Sites	Areas	WS (%)	NavBar
Harvard University	2	0	V
University of California, Berkeley	3	20	V
University of Michigan	4	10	
Princeton University	5	0	V
Yale University	3	40	V
Brown University	5	50	H
University of Chicago	2	20	V
University of Texas at Austin	5	20	H
University of California, Los Angeles	2	20	V
Columbia University	4	10	H
University of North Carolina at Chapel Hill	3	30	H
Cornell University	4	20	
University of Pennsylvania	4	0	
Bryn Mawr College	2	20	
Duke University	4	30	V
Stanford University	4	40	H
University of Illinois, Urbana-Champaign	3	20	V
University of Virginia	2	10	V
University of Wisconsin, Madison	3	20	H
University of Washington	4	0	
University of North Carolina Sites	Areas	WS (%)	NavBar
School of Education	6	10	H
School of Information and Library Science	11	20	
School of Law	4	20	V
School of Medicine	5	20	V
School of Journalism and Mass Comm.	6	30	V
Department of Art	3	20	H
Department of Computer Science	5	20	H
Department of English	5	20	H
Department of Physics and Astronomy	4	30	H
Department of Sociology	3	30	V
Averages	Areas	WS (%)	NavBar (H/V)
Classics Sites (20)	3.4	19	**75** (40/60)
University of North Carolina (10)	5.20	22	**90** (55/45)
Total Sites (30)	4.00	20	**80** (37/43)

Areas = How many distinct areas are present on the page?
WS (%) = What percentage of the page is made up of intentional white space?
NavBar = Does the page offer a navigation bar? If so, is it horizontal (H) or vertical (V)?

Appendix F: Disability Access Scoring

Classics Sites	B1	B2	B3	Text
Harvard University	NO	NO	NO	NO
University of California, Berkeley	NO	NO	NO	NO
University of Michigan	NO	NO	NO	NO
Princeton University	NO	NO	NO	NO
Yale University	NO	NO	NO	NO
Brown University	**YES**	NO	NO	NO
University of Chicago	NO	NO	NO	NO
University of Texas at Austin	NO	NO	NO	NO
University of California, Los Angeles	NO	NO	NO	NO
Columbia University	NO	NO	NO	NO
University of North Carolina at Chapel Hill	**YES**	NO	NO	NO
Cornell University	NO	NO	NO	NO
University of Pennsylvania	NO	NO	NO	NO
Bryn Mawr College	NO	NO	NO	NO
Duke University	NO	NO	NO	NO
Stanford University	NO	NO	NO	**YES**
University of Illinois, Urbana-Champaign	NO	NO	NO	NO
University of Virginia	NO	NO	NO	NO
University of Wisconsin, Madison	NO	NO	NO	NO
University of Washington	NO	NO	NO	NO
University of North Carolina Sites	B1	B2	B3	Text
School of Education	NO	NO	NO	NO
School of Information and Library Science	NO	NO	NO	NO
School of Law	NO	NO	NO	NO
School of Medicine	**YES**	NO	NO	NO
School of Journalism and Mass Comm.	NO	NO	NO	NO
Department of Art	NO	NO	NO	NO
Department of Computer Science	NO	NO	NO	NO
Department of English	NO	NO	NO	NO
Department of Physics and Astronomy	**YES**	NO	NO	NO
Department of Sociology	**YES**	NO	NO	**YES**
Percentages	B1 (%)	B2 (%)	B3 (%)	Text (%)
Classics Sites (20)	10	0	0	5
University of North Carolina (10)	30	0	0	10
Total Sites (30)	16.67	0	0	6.67

B1 = Bobby Level 1 compliance; **B2** = Bobby Level 2 compliance
B3 = Bobby Level 3 compliance; **Text** = Text-only version available

Appendix G: Linkage Scoring

Classics Sites	Parent	Top-Level	External
Harvard University	NO	NO	YES
University of California, Berkeley	YES	YES	YES
University of Michigan	NO	YES	YES
Princeton University	NO	NO	YES
Yale University	YES	YES	YES
Brown University	NO	YES	YES
University of Chicago	NO	NO	YES
University of Texas at Austin	YES	NO	YES
University of California, Los Angeles	NO	YES	YES
Columbia University	NO	NO	NO
University of North Carolina at Chapel Hill	NO	NO	YES
Cornell University	YES	YES	YES
University of Pennsylvania	YES	NO	YES
Bryn Mawr College	NO	YES	YES
Duke University	YES	YES	YES
Stanford University	NO	YES	YES
University of Illinois, Urbana-Champaign	NO	YES	YES
University of Virginia	NO	YES	NO
University of Wisconsin, Madison	YES	YES	YES
University of Washington	NO	YES	YES
University of North Carolina Sites	Parent	Top-Level	External
School of Education	YES	YES	NO
School of Information and Library Science	YES	YES	NO
School of Law	YES	YES	NO
School of Medicine	NO	YES	NO
School of Journalism and Mass Comm.	YES	YES	NO
Department of Art	NO	YES	NO
Department of Computer Science	YES	YES	NO
Department of English	YES	NO	YES
Department of Physics and Astronomy	YES	YES	NO
Department of Sociology	NO	NO	YES
Percentages	Parent (%)	Top-Level (%)	External (%)
Classics Sites (20)	35	65	**90**
University of North Carolina (10)	**70**	**80**	20
Total Sites (30)	46.7	70	66.7

Parent = Site includes a link to its parent, often a College;
Top-Level = Site includes a link to its top-level site, often a University;
External = Site includes discipline-specific links to external sites

Appendix H: Networking Issues Scoring

Classics Sites	Graphics	Size	Time
Harvard University	3	22.64	8.29
University of California, Berkeley	4	24.13	10.2
University of Michigan	3	54.33	16.59
Princeton University	12	22.5	10.75
Yale University	3	41.65	18.07
Brown University	1	10.67	4.46
University of Chicago	4	15.12	8.2
University of Texas at Austin	7	77.71	27.59
University of California, Los Angeles	2	58.5	18.25
Columbia University	11	33.84	15.4
University of North Carolina at Chapel Hill	10	97.9	32.19
Cornell University	2	31.59	10.78
University of Pennsylvania	1	14.95	6.15
Bryn Mawr College	4	40.17	13.66
Duke University	3	45.79	15.22
Stanford University	15	20.73	7.26
University of Illinois, Urbana-Champaign	12	32.59	16.55
University of Virginia	9	207.59	63.66
University of Wisconsin, Madison	1	68.49	20.03
University of Washington	1	24.86	7.91
University of North Carolina Sites	Graphics	Size	Time
School of Education	10	96.19	33.72
School of Information and Library Science	17	58.56	19.27
School of Law	6	30.08	12.36
School of Medicine	3	103.44	37.23
School of Journalism and Mass Comm.	6	62.47	25.35
Department of Art	6	92.28	28.63
Department of Computer Science	12	93.02	36.34
Department of English	4	60.29	20.25
Department of Physics and Astronomy	12	74.8	27.78
Department of Sociology	3	30.58	10.5
Averages	Graphics	Size	Time
Classics Sites (20)	5.40	47.29	16.56
University of North Carolina (10)	7.90	70.17	25.14
Total Sites (30)	6.23	54.92	19.42

Graphics = How many graphics are present on the page?
Size = What is the size of the page (measured in kilobytes, KB)?
Time = How long does the page take to download on a 28.8 baud modem (measured in seconds, s)?

Appendix I: Web Technology Scoring

Classics Sites	Server	Client	Style	HTML4	Frames
Harvard University	NO	NO	NO	NO	NO
University of California, Berkeley	NO	NO	NO	NO	NO
University of Michigan	NO	NO	NO	NO	NO
Princeton University	NO	NO	NO	NO	NO
Yale University	NO	YES	YES	NO	NO
Brown University	NO	YES	NO	NO	NO
University of Chicago	NO	NO	NO	NO	NO
University of Texas at Austin	NO	NO	NO	NO	NO
University of California, Los Angeles	NO	NO	NO	NO	NO
Columbia University	NO	YES	NO	NO	NO
University of North Carolina at Chapel Hill	YES	YES	YES	NO	YES
Cornell University	NO	NO	NO	NO	NO
University of Pennsylvania	NO	NO	NO	NO	NO
Bryn Mawr College	NO	NO	NO	NO	NO
Duke University	NO	YES	YES	NO	NO
Stanford University	YES	YES	YES	YES	YES
University of Illinois, Urbana-Champaign	NO	YES	YES	NO	NO
University of Virginia	NO	YES	NO	NO	NO
University of Wisconsin, Madison	NO	NO	NO	NO	NO
University of Washington	NO	NO	NO	NO	NO
University of North Carolina Sites	Server	Client	Style	HTML4	Frames
School of Education	NO	YES	NO	NO	NO
School of Information and Library Science	YES	NO	NO	NO	NO
School of Law	YES	NO	NO	NO	NO
School of Medicine	NO	YES	YES	NO	NO
School of Journalism and Mass Comm.	NO	YES	NO	NO	NO
Department of Art	NO	YES	NO	NO	NO
Department of Computer Science	NO	YES	NO	NO	NO
Department of English	NO	NO	YES	NO	NO
Department of Physics and Astronomy	YES	NO	YES	NO	NO
Department of Sociology	NO	NO	NO	NO	NO
Percentages	Server (%)	Client (%)	Style (%)	HTML4 (%)	Frames (%)
Classics Sites (20)	10	40	25	5	25
University of North Carolina (10)	30	50	30	0	0
Total Sites (30)	16.67	43.33	26.67	3.33	16.67

Server = Does the site employ server-side scripting (e.g., ASP, PHP, Perl, etc.)?
Client = Does the site employ client-side scripting (e.g., JavaScript)?
Style = Does the site employ cascading stylesheets (CSS)?
HTML4 = Does the site employ advanced HTML (e.g., DHTML, HTML 4.0,e etc.)?
Frames = Does the site employ frames?

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