

Offering distance education in Health Informatics: The state of the Web sites

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Abstract. Within the framework of a bi-national project, a prototype database of programs and courses in Health Informatics was implemented. More than 100 sites of programs and courses in institutions in several countries were examined. While the database included courses delivered both on-site, as distance learning and as a combination of both methods of delivery, we expected that in particular the Web sites of courses for which the method of delivery was distance education exclusively would supply all the information needed by potential customers, all of whom were presumably dependent on the site for information about the course. This assumption was not borne out by the Web sites we retrieved. A content analysis of the sites was conducted, using 13 questions/criteria, and recommendations were drafted based on the data of the analysis.

1. Introduction: Background of the study

In the spring of 2000, a Collaborative Planning Group composed of five members of each of the senior faculty members of The School of Information and Library Science of The University of North Carolina at Chapel Hill and an interuniversity team from four of Israel's universities proposed and were funded for a preliminary workshop – part virtual, part on-site, and part video-conference. This workshop, funded by the Bi-National Science Foundation and the North Carolina–Israel Project, was envisioned as the first stage in a larger plan to develop an international, collaborative distance education certificate program in Health Informatics. Within the framework of this bi-national project, entitled *Cooperative International Distance Education in Health Sciences Knowledge Management*, Part I. The Virtual Workshop was carried out by the Israeli team. An interactive Web site for the Collaborative Planning Group (hereafter referred to as the CPG) was designed and implemented on a server in Israel. The planning, programming, information retrieval and input of content to the database took place during the period from September 1, 2000–February 1, 2001. The database consists two parts:

- A threaded discussion group for the members of the CPG to exchange ideas on all relevant topics and to document the structure, programming and changes in the directories as they were built;
- An inventory of online forms, formatted in XML, which were utilized to create two directories:
 1. A directory of existing courses in Health Sciences Knowledge Management;
 2. A directory of experts in Health Sciences Knowledge Management.

1.1. The scope and structure of the database

The *scope* of the first directory was defined as follows:

- *Directory 1: Courses*

- * *includes* all aspects of health informatics, excluding courses using databases as a means to teach medicine or another health science.

This directory was structured to include the following fields:

- *Directory 1: Courses*

- Name of program;
- Name of course;
- Educational level of course/program;
- Institution;
- City;
- State (US);
- Country;
- Contact person;
- Contact's e-mail;
- Language of course;
- Teaching medium;
- Teaching aids;
- Length of course/program;
- Cost of course/program;
- Number of courses in program;
- Profession of students;
- Keywords;
- Source;
- Notes.

The scope and structure of the second directory were as follows:

Scope

- *Directory 2: Experts*

- * *includes:*

- those who have taught a course or run a program in Health Sciences Knowledge Management;
- those who have published an article in Health Sciences Knowledge Management;

Structure

- *Directory 2: Experts*

- Name;
- Institution;
- City;
- State (US);
- Country;
- Field of Expertise;
- E-mail;
- Source.

In this article, we do not directly discuss the Experts directory, but it can be accessed at the NCIP interactive web site (which includes both directories and the Threaded Discussion List) at <http://infosoc.haifa.ac.il/NCIP/>.

1.2. Collecting material for the database: the problem

The search for Web sites offering programs and courses in Health Informatics was conducted by the two authors of this article. In order to collect material for the course database, more than 100 sites of programs and courses in institutions in several countries were examined.

Collecting data from these sites required very extensive searching because of a lack of standardization in the structure of the sites, defects in supplying information about the courses and programs, and lack of the basic information that it would be reasonable to expect would be included in the sites. While the database included courses delivered both on-site, as distance learning and as a combination of both methods of delivery, we expected that in particular the Web sites of courses for which the method of delivery was distance education exclusively would supply all the information needed by potential customers, all of whom were presumably dependent on the site for information about the course.

This assumption, which was not borne out by the Web sites we retrieved, drew us to carry out a content analysis of these sites according to criteria of (1) content, (2) form and (3) usability.

2. Goals of the research

Web sites of institutions of higher education are an important source of information to students, faculty and all those interested in courses and programs, and particularly, in distance education courses and programs. In the process of our work on the cooperative workshop, we became aware of the need for a thorough analysis of these Web sites. Our aim was determining the problems with these sites and formulating recommendations about how to construct effective sites of information about these courses/programs, based on the preliminary conceptual requirements we defined in the course of our work on the prototype database of programs and courses in Health Informatics.

3. Previous studies

A survey of the literature revealed that while there is an extensive body of literature on Web site evaluation criteria and a growing body of literature on Web site usability (ease of use), there have been very few studies evaluating course/program Web sites either by general evaluation criteria or usability criteria.

A recent article by Alyson Tyler [7] surveyed distance learning library and information sciences courses delivered via the Internet with the aim of investigating both what courses are available and assessing the current market situation for online courses. During the research period (April–June 2000) she came to the conclusion that “degree programmes offered wholly online in the LIS field are not as prevalent as might be initially expected” [7]. She also observed that most distance learning LIS programs that were identified and analyzed relied upon a mix of modes for delivering the course, often consisting of paper, textbooks, audio tapes, some online modules, e-conferencing and online discussion groups. The number of courses available and delivered entirely online was small and led her to assert a need to identify the possible constraints affecting departments offering online courses. She divides the courses into self-instruction courses, short credit courses and full degree programs, stating as mentioned above that there are not many whole degree programs, and that short credit courses that contribute to a whole degree program are particularly prevalent in the United States. Our study confirmed all of her findings – that there are few whole online programs, that most of the short courses are in the United States, and that most of what universities call distance LIS courses are in fact given partly on-site and/or partly paper-based. Of the 111 health informatics sites retrieved in our original search, slightly over 32% – less than one third – were fully distance courses by our definition, although a number of other courses were referred to as distance courses in the course descriptions.

Middleton, McConnell and Davidson in a 1999 article analyze what should be in a university Web site and propose a model for the structure and content of a university Web site by a process of (1) identifying who the site is serving and the information needs of these individuals or groups; (2) identifying institutional information needs; (3) relating this data to the content provided; and (4) presenting the content in a manner suited to the characteristics and information needs of the target user groups [2]. Discussing external users of a university Web site (ostensibly the primary audience for distance education courses), they note:

External users are *target* markets. . . There is thus a pressing need to *attract* this audience's attention as soon as possible and then hold it. Information bias must then be towards *promotion*. . . Such information might include course/prospectus information, local information, mission statements, frequently asked questions, travel and accommodations information, press releases, contacts, job openings, downloadable forms, entertainment, feedback information, etc. [2].

Middleton et al. emphasize also that since "the primary function of a Web site is to provide information", important information should be presented at the top level of the site, rather than simply providing links to where information may potentially be found [2].

A 1995 online survey of nearly 500 college and university Web sites [6] is interesting in spite of its age primarily because of an observation in a section called *Trends of Colleges and Universities and WWW Development*, noting that "several aspects of academia have already been 'virtualized' . . . the visual image of a university (interactive campus tours), the admission process (on-line applications) and the life of an institution (school publications)" [6]. One of the elements examined in the current study was the interactive online application form. We found the application process less "virtualized" six years later than the optimism of the 1995 survey might have led us to expect.

Although none of the large body of Web site evaluation literature and Web site usability literature focuses specifically on university Web sites, let alone on distance education course information sites, each of the two groups focuses on some of the elements analyzed in our study.

A well-known article on evaluating Web sites was published in 1997 by Smith [5]. Smith proposes a "toolbox of criteria" for selecting Internet information sources for a resource guide, a particular user or a query. Smith's toolbox has become a classic, existing in several versions and linked to many sites giving guidelines for evaluation of Web sites, such as the World Wide Web Virtual Library [12]. His toolbox lists general criteria, but it includes as well some of the specific criteria by which the distance education course sites were evaluated in our study, such as currency, links made to other resources, graphics and multimedia design, audience, search engine, and interactivity.

University library sites often have links to checklists for enabling its users to carry out Web site evaluation. Examples of this type of checklist can be found on the sites of Dalhousie University Libraries (Canada) [1] and of the University of Maryland Libraries [8]. The first example is composed of a list of yes/no questions, organized by category (Authority, Purpose, Coverage, Currency, Objectivity and Accuracy). The evaluator is informed on the Checklist that "the greater number of times you answered *Yes*, the more likely the page is of higher informational quality". The second example, organized similarly by categories, uses multiple-choice answers to aid in evaluating Web sites. The Dalhousie Checklist in particular asks many of the same questions we asked, such as:

- Is the information geared toward a specific audience?
- Does the site have relevant outside links?
- Is the date the information was last revised written?

- Are the links up-to-date and reliable?
- Has the author clearly provided all contact information including e-mail address. . . ? [1].

Usability literature examines “ease of use” of a site, a subset of the general evaluation criteria, which focus also on other aspects, such as authority, currency, and general functionality of a site. The man whose name is synonymous with usability testing, Jakob Nielsen, in his recent book, *Designing Web Usability: The Practice of Simplicity* [3] states his principles of usability as follows: (1) use simple and natural dialog; (2) speak the user’s language; (3) ensure that instructions are easily visible or retrievable; (4) design consistency; (4) give user appropriate system feedback; (6) provide clearly marked exits; (7) provide shortcuts; (8) display easily interpreted error message; (9) design to prevent errors; and (10) provide help and documentation.

Nielsen’s Web site on usability, useit.com [9], features a regular column called “Alertbox”, in which he discusses individual usability problems and issues. For example in the May 13, 2001 Alertbox [11], Nielsen stresses the importance of a search engine on a complex informational site: “Search is the user’s lifeline for mastering complex websites. The best designs offer a simple search box on the home page” [11]. In another Alertbox on Navigation [10], Nielsen again stresses the need for a search engine – “users turn to search when they are lost” [10] – and of local links to related contents.

Finally, the issue of the *order* of information on a Web site, i.e., how many links it takes to get to what a user most wants, is explored by Schaffer [4] in a journal focusing on electronic banking. In specialized fields such as banking, Schaffer contends, users will stay with sites that give them information quickly and pleasantly. “Three clicks and that’s it. Most Web site users allow only three clicks to be impressed with your product. . . your home page must be easily accessible as well as eye-catching and informative. The imperatives are point, click and find the right department” [4].

4. Methodology

In order to be both comprehensive and exhaustive, 3 methods were used in the original search carried out between September 2000 and February 2001:

1. Searching in bibliographic databases (e.g., Eric, Inspec, Medline) for studies of programs/courses in the defined subjects: various aspects of health informatics.
2. Searching the Web:
 - a. Searching for portals of professional associations, e.g., International Medical Informatics Association (IMIA), American Medical Informatics Association (AMIA), Medical Library Association (MLA).
 - b. Searching the Web according to subject keywords, e.g., health informatics, health sciences knowledge management.

For this follow-up study, conducted between July 2001 and September 2001 (15–18 months later), all the sites were retrieved and examined again. Of the 111 sites retrieved in the original search carried out for the pilot study, describing programs or courses in health informatics in the United States, Britain, or Israel – the countries chosen for the pilot study – 36 sites advertised courses or entire programs for which the method of delivery was exclusively or primarily online, i.e., which could be defined as distance education courses (as opposed to courses which contained a distance education component but which were

fundamentally on-site courses, requiring attendance at lectures). Of these 36 sites, 9 advertised entire distance education programs in health informatics, while 27 of the sites described individual courses (including courses which were part of the 9 programs). With regard to the breakdown by nationality, 32 sites advertised courses or programs in the US, and 4 advertised courses or programs in the UK. All of the programs or courses which were no longer available were in the US.

The methodology chosen for the study was content analysis. The criteria on which we based our analysis examined:

1. Course content;
2. Course teaching tools; and
3. Administrative details.

Thus, an analysis of the 36 distance education sites singled out in the follow-up search was conducted using the following questions, which covered information from the above three categories and examined the criteria we considered essential for design of a site offering distance education courses:

1. What is the role of static information on the site; what is the role of dynamic information on the site and what is the frequency of update?
2. What is the information given in the sequence of HTML pages, and how many such pages appear in the sites?
3. What information is given in links and how many links must be activated consecutively in order to reach the required information?
4. Does the site have an internal search engine?
5. Does the site give keywords which reflect the content and enable a productive search?
6. What is the structure of the site with regard to the order in which topics are presented, i.e., are the most important topics connected to the courses available near the beginning of the site?
7. Are there essential administrative details on the site, such as the name of the contact person, the cost of the course/program, the scope and length of the course/program?
8. What is the profession or discipline(s) of the people for whom the course is intended?
9. What are the methods of delivery (synchronous, asynchronous or a combination of the two)?
10. Are the teaching tools used in the course specified?
11. Are there other sites linked to the course/program site, such as sites of the instructors?
12. Does the site include pictures, graphics, films and audio components?
13. Are there interactive components to the site, allowing students to contact the institution and receive answers?

In order to answer these questions, a work form for site analysis was developed (see Appendix). The work form broke each of the above questions into criteria which were then recorded as present or absent for each site. In addition the work form recorded the number of links required to reach each parameter and the last update of the page on which the parameter was found. After the study was completed it was found that generally the information on a site, if it was not all on the course/program home page, was either updated more or less concurrently with the home page or that only the home page was given an update date (if a date was included at all), so it was decided not to analyze the differential between update dates of different pages on the same site, but only of the last update date on the home page.

5. Results

Overall results for the sites included the following:

- 7 of the 36 sites (19%) had removed all information on course/program in the 15–18 months between the original search and the follow-up. We termed these sites “*dead courses*”.
- 5 courses (17%) had no link back to the program/school/university home page. We termed these sites “*orphaned courses*”.
- 3 programs (out of 9) (33%) had no descriptions of/links to individual courses. We termed these sites “*barren programs*”.
- 4 courses (14% of those with online forms) had online registration forms that didn’t work: We called this phenomenon “*failed interactivity*”.

All the sites with “dead courses” remained retrievable at the original URL, but on the site itself course details were usually replaced by an announcement to the effect that the course was “currently unavailable” or “no longer offered”, or that “the informatics track is now closed for new intake”. In a few cases, the program page had links to course numbers which, when clicked on, now took the user to the login page of Blackboard rather than to the course.

The presence or absence of specific information elements on the sites is presented below in Table 1.

In this table, $n = 36$ sites, including 10 entire programs. However since 7 of the 36 sites had removed information on the course or program, the percentages given are for the 29 sites which retained analyzable

Table 1
Percentage of sites missing information

Field/Criterion	
1. Last update	48%
2. Educational level	17%
3. Institution	7%
4. City	21%
5. State (US)	16%
6. Country	86%
7. Contact person	10%
8. Contact’s e-mail	3%
9. Language of course	72%
10. Length of course/program	41%
11. Cost	31%
12. Profession of students	45%
13. Prerequisites	24%
14. No. of courses in program	0%
15. Method of delivery/medium	17%
16. Links to related sites	7%
17. Search engine	66%
18. Internal keywords	79%
19. Teaching aids	21%
20. Pictures/graphics	52%
21. Films	100%
22. Audio component	100%
23. Interactive component	48%

Table 2

Missing information in descending order of frequency

1. Films, Audio component	100%
2. Links to related sites	93%
3. Country	86%
4. Internal keywords	79%
5. Language of course	72%
6. Search engine	66%
7. Pictures/graphics	52%
8. Last update, Interactive component	48%
9. Profession of students	45%
10. Length of course/program	41%
11. Cost	31%
12. Prerequisites	24%
13. City, Teaching aids	21%
14. Method of delivery, Educational level	17%
15. State (US only)	16%
16. Contact person	10%
17. Institution	7%
18. Contact's e-mail	3%

information. Of these, 28 were sites of individual courses and 1 was a site for a whole program. Therefore, element 14 (No. of courses in program) refers to only the sites (9 out of 36) which were whole programs. For element 20 (Pictures/graphics), we did not count the pages with the school's logo only as having graphics. Finally, for element 23 (Interactive component), we counted an interactive link – usually a link to an online registration form – that didn't work as a missing element.

Table 2 summarizes missing elements in descending order of percentage of sites from which they are missing.

An additional finding, included in Table 1 but not in the above table (since it was not a missing element) was a change in the URL of the site. Within the 15–18 months between the original search and the follow-up search 5 (17%) of the sites for which the courses were still operative had changed their addresses. None of these had links to the new address, and all had to be searched by a key term to be located. Interestingly, none of the courses/programs which had become inoperative had changed URLs.

The answer to question 3, "What information is given in links and how many links must be activated consecutively in order to reach the required information?" is presented in Table 3.

Table 4 summarizes information elements which were found on the home page (i.e., which required no links to reach) in descending order by percentage of sites.

Frequency of update, where given, is presented in Table 5 in descending order of frequency.

6. Discussion

The results provide answers to the original questions posed in the study as follows:

1. *What is the role of static information on the site; what is the role of dynamic information on the site and what is the frequency of update?*

Table 3
Number of links required to reach information (where available) by % of sites

Field/Criterion	On home page	1 Link	2 Links	3 Links	4 Links	5 Links
1. Educational level	92%	4%	4%			
2. Institution	100%					
3. City	48%	52%				
4. State (US)	76%	24%				
5. Country	100%					
6. Contact person	88%	12%				
7. Contact's e-mail	89%	11%				
8. Language of course	63%	37%				
8. Length of course/program	65%	23%	6%			6%
10. Cost	35%	50%	5%	5%		5%
11. Profession of students	81%	13%	6%			
12. Prerequisites	82%	14%				4%
13. No. of courses in program	80%	20%				
14. Method of delivery/medium	67%	33%				
15. Search engine	100%					
16. Internal keywords	83%	17%				
17. Teaching aids	57%	39%	4%			
18. Pictures/graphics	100%					
19. Interactive component	33%	13%	47%			7%

Table 4
Order of elements by % requiring no links to reach them

1. Institution, Country, Search engine, Pictures/graphics	100% on home page
2. Educational level	92% on home page
3. Contact's e-mail	89% on home page
4. Contact person	88% on home page
5. Internal keywords	83% on home page
6. Prerequisites	82% on home page
7. Profession of students	81% on home page
8. No. of courses in program	80% on home page
9. State (US)	76% on home page
10. Method of delivery	67% on home page
11. Length of course/program	65% on home page
12. Language of course	63% on home page
13. Teaching aids	57% on home page
14. City	48% on home page
15. Cost	35% on home page
16. Interactive component	33% on home page

Static information on the site included Educational Level, Institution, City, State, Country, Contact Person, Contact's E-mail, Language of Course – fields 2–9, which listed primarily logistical information (except Language, which for obvious reasons is also static). Dynamic information – all the information related to the details of the course or program itself– were Length of Course/Program, Cost, Profession of Students, Prerequisites, No. of Courses in Program, Method of Delivery/Medium (Subfields: Asynchro-

Table 5
Frequency of update

Interval since last update	% of sites
1–2 months	26%
3–4 months	0%
5–6 months	14%
7–8 months	20%
9–10 months	7%
11–12 months	7%
Over 1 year	26%
Total	100%

nous, Synchronous, Both Synchronous/Asynchronous), Links to Related Sites, Search Engine, Internal Keywords, Teaching Aids, Pictures/Graphics, Films, Audio Component, Interactive Component, and a field which included data on whether the follow-up search found the site at the original URL at which it was retrieved the first time (fields 10–24).

Among the elements giving static information, Country and Language were most frequently omitted. The reason is probably that it was assumed they were obvious, rather than that they were considered unimportant (e.g., that everyone knows that the University of North Carolina is in the United States and that any courses it gives in Health Informatics will be in English). Aside from these two static information elements, most of the rest of the elements missing from a high percentage of the sites were elements of dynamic information about the course itself. Promotional films and audio components were totally absent, indicating a tendency to keep the flashy technology, if it is used, for the courses, not for the websites advertising the courses. Internal keywords and search engines were missing from more than half the sites. Interactive components – in particular, online registration forms – were present in slightly more than half the sites, but 14% of them didn't work. Essential information concerning the population for which the course was intended, the length and cost of the course, and the prerequisites for taking the course were missing in a third to nearly half of the sites.

On the other hand, a surprisingly large percentage of the sites (79%) gave details about the teaching aids – such as email, WebCT software, an online “Study Skills Pack” – used in the course, and 83% of the sites stated specifically whether the method of delivery was asynchronous, synchronous or a combination of the two. The contact person or persons and the contact's email were almost universally present (97%) on all the sites and were obviously considered the single most important informational element for prospective students.

Frequency of update of the sites varied widely, with a quarter of the sites showing an update frequency of under two months and a quarter of the sites showing an update frequency of over a year. The other half of the sites fell between these two extremes: nearly another quarter of the sites had last been updated 7–8 months earlier, and the rest of the sites 5–6 months earlier or 9–12 months earlier. The trend seemed to be that either the sites are updated very often or very seldom.

2. *What is the information given in the sequence of HTML pages, and how many such pages appear in the sites?*

Elements of essential information given most often (in at least 2/3 of the sites), in descending order of frequency, are: contact's e-mail, institution, contact person, state, method of delivery of the course, educational level of the course, city in which the institution is located, teaching aids used, prerequisites and cost.

Elements of information given least often (in less than 2/3 of the sites), again in descending order of frequency, are: length of the course or program, profession of the students for whom the course is intended, last update of the site, language of the course, keywords describing the course, and the country in which the institution is located.

As to the number of pages in the sites, they varied greatly – from a home page which printed out as a single page to sites which yielded nearly 50 printed pages. There was not always a direct correspondence between the size of the site and the number of essential elements of information the site included. In particular some of the sites in the UK supplied a great deal of information very concisely, including nearly all the information we deemed essential on the home page.

3. What information is given in links and how many links must be activated consecutively in order to reach the required information?

Information that required up to 5 links to reach included the length of the course or program, the cost and the prerequisites. None of the elements we analyzed required 4 links to reach, and the cost required 3 links to reach on only one site. The educational level, profession of the students, teaching aids and the interactive component (i.e., the online registration form) required up to 2 links to reach. The city and state in which the institution was located, the contact person and that person's e-mail, the language of the course, the number of courses in a program, the method of delivery, and internal keywords, if present on a site, never required more than 1 link to reach from the home page.

4. Does the site have an internal search engine?

Only 34% of the sites analyzed had an internal search engine.

5. Does the site give keywords which reflect the content and enable a productive search?

An even smaller percentage of the sites – 21% – included internal keywords.

6. What is the structure of the site with regard to the order in which topics are presented, i.e., are the most important topics connected to the courses available near the beginning of the site?

Generally, most of the key elements were near the beginning (home page) of the site, but not all. Among the important elements which often were not are the cost of the course or program and the interactive registration form. Other important elements which appeared at least one link away on at least 1/3 of the sites including the element at all are the length of the course or program, the language of the course, the teaching aids and, surprisingly, the city in which the institution was located.

7. Are there essential administrative details on the site, such as the name of the contact person, the cost of the course/program, the scope and length of the course/program?

The name of the contact person was nearly always given on the site (90% of the sites). The cost of the course/program was given on about 2/3 of the sites (69%). The scope and length of the course/program was included on slightly more than half of the sites (59%). Using these administrative details as examples, the answer to this question would be negative for a significant proportion of the sites examined.

8. What is the profession or discipline(s) of the people for whom the course is intended?

The profession of the people for whom the course or program was intended was stated on only slightly more than half of the sites (55%).

9. What are the methods of delivery (synchronous, asynchronous or a combination of the two)?

One of the results we found surprising was that the method or methods of delivery for the course or program was clearly stated on 87% of the sites, including sites that neglected to mention such details as how much the course cost or how long the program or course took to complete.

10. Are the teaching tools used in the course specified?

Like the method of delivery, the teaching tools were usually described on the sites (79%). A possible reason that the teaching tools and method of delivery were nearly always included may be that they were considered selling points for attracting students. Costs and duration of the course, on the other hand, were likely either to deter potential students or, at best, they were accepted by them in order to take advantage of the attractive new teaching methods.

11. Are there other sites linked to the course/program site, such as sites of the instructors?

Nearly all of the sites (93%) did include links to other relevant sites, such as sites of the instructors.

12. Does the site include pictures, graphics, films and audio components?

Another surprising finding was that these sites made rather low use of graphics of any kind, other than the institution's logo (only 48% included graphics or pictures), and that none of them used films or audio components to attract students. Apparently, any use of video or audio components is saved for the courses themselves.

13. Are there interactive components to the site, allowing students to contact the institution and receive answers?

Approximately half of the sites (52%) included an interactive component, and most of these interactive components were online registration forms. As mentioned earlier, the actual figure for sites including interactive components is slightly higher, but if the interactive component did not function, it was not included in the percentage for this element.

7. Conclusions and recommendations

From the data culled from content analysis of the Web sites using the above criteria, recommendations were drafted with regard to the correct organization of sites describing and advertising distance education courses within institutions of higher education:

1. The Web site of a program or course must reflect both the content and the context of the course/program.
2. We cannot expect a uniform format for the sites, but at least some requirements for site design, topics to be included and their order of appearance need to be standardized:
 - Distance course site designers must be particularly sure not to leave “orphaned courses” or programs with no description of its details on the Web to frustrate users.
 - Online registration forms must work, or it is better not to have them at all.
 - Costs of courses must be on the site and near or on the home page.
 - Length of the course must be included: distance courses are not necessarily “work at your own pace” courses, and students need to know the time frame.

A further stage in the research – a user study to verify and refine the findings and recommendations from this study – is planned. In addition, a future project we are considering is to study the search path of visitors to the sites through transaction log analysis. Results of the two projects will give us a fuller picture of how to design a website to advertise a distance education course.

Appendix A: Course/Program Web sites analyzed

1. Distance Learning Graduate Certificate in Medical Informatics Program.
<http://www.ohsu.edu/bicc-informatics/distance/certificate.shtml>.
2. Distance Learning Graduate Certificate in Medical Informatics. Introduction to Medical Informatics: Medical Informatics 510.
<http://www.ohsu.edu/bicc-informatics/ms/courses/minf510/>.
3. Distance Learning Graduate Certificate in Medical Informatics. Information Retrieval: OHSU Medical Informatics 514.
<http://www.ohsu.edu/bicc-informatics/ms/courses/minf514/>.
4. Distance Learning Graduate Certificate in Medical Informatics. Consumer Health Informatics: MINF 520.
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5. Duke University Nursing Informatics: Technologies for Enhancing Nursing Practice: Distance-Based Program.
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6. Introduction to Health Care Informatics.
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7. Clinical and Bio Informatics Short Course Series.
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8. Clinical and Bio Informatics Short Course Series. Medical Informatics Introductory Short Course.
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9. Clinical and Bio Informatics Short Course Series. Computer-Assisted Medical Decision Making.
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10. Clinical and Bio Informatics Short Course Series. Computational Molecular Biology.
<http://scpd.stanford.edu/smiseries/cmb.html>.
11. Clinical and Bio Informatics Short Course Series. Protein Architecture, Dynamics, and Structure Prediction.
<http://scpd.stanford.edu/smiseries/padsp.html>.
12. Clinical and Bio Informatics Short Course Series. Representations and Algorithms for Computational Molecular Biology.
<http://scpd.stanford.edu/smiseries/racmb.html>.
13. Health Informatics Certificate Program.
http://www.sbhis.uic.edu/GradBk98-99/him_certificate_program.htm.
14. Health Informatics Certificate Program. Health Care Data.
<http://www.uic.edu/classes/bhis/bhis437/>.
15. Health Informatics Certificate Program. Survey of Health Care Information Systems.
<http://www.uic.edu/classes/bhis/>.
16. Health Informatics Certificate Program. Management of Health Care Communication Systems.
<http://www.uic.edu/classes/bhis/>.

17. Health Informatics Certificate Program. Health Information Analysis and Design.
<http://www.uic.edu/classes/bhis/bhis520/>.
18. Applications in Health Information Management. Management of Health Care Communication Systems.
<http://www.uic.edu/classes/bhis/>.
19. Applications in Health Information Management. Topics in Health Information Management.
<http://www.uic.edu/classes/bhis/>.
20. MSc in Primary Health Care by web-based distance learning.
<http://www.ucl.ac.uk/primcare-popsoci/msc/>.
21. The Fall 2001 Undergraduate SLN Distance Learning Course in Medical Informatics.
http://www.albany.edu/medical_informatics/.
22. Evidence-Based Medicine and the Medical Librarian.
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23. Health Informatics courses – Distance Learning.
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24. Nursing and Healthcare Informatics Nursing Elective (N490).
<http://cf.uwex.edu/ics/disted/spr00/CourseDetails.cfm?ProgramID=718>.
25. Nursing Informatics using WebCT.
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29. Nursing 3935 - Technology in Health Care.
<http://ruby.fgcu.edu/courses/Gray-Vickrey/Technology/tech.html>.
30. Introduction to Nursing Informatics.
<http://www.wright.edu/dl/courses/nur210.html>.
31. NU 333 Nursing Informatics.
<http://www.lcsc.edu/dlt/courseinfo/NU333.htm>.
32. Nursing and Healthcare Informatics N490 (Elective).
<http://cf.uwex.edu/ics/disted/spr01/CourseDetails.cfm?ProgramID=1260>.
33. MSc/Diploma in Pharmaceutical Information Management.
<http://www.soi.city.ac.uk/is/teaching/pim/>.
34. Nursing Informatics.
<http://www.lcsc.edu/dlt/courseinfo/NU333.htm>.
35. Health Information Systems.
<http://distance.jhsph.edu/his/>.
36. Introduction to Nursing Informatics (GRNU 296).
<http://nursing.uvm.edu/grnu296.html>.

Appendix B

#:

NAME OF PROGRAM:

NAME OF COURSE:

URL:

FIELD/CRITERION	YES	NO	# OF LINKS TO REACH	LAST UPDATE OF PAGE	*DETAILS/REMARKS
1.DATE OF INPUT					
2.EDUCATIONAL LEVEL					
3.INSTITUTION					
4.CITY					
5.STATE (US)					
6.COUNTRY					
7.CONTACT PERSON					
8.CONTACT 'S E-MAIL					
9.LANGUAGE OF COURSE					
10. LENGTH OF COURSE/PROGRAM					
11. COST					
12. PROFESSION OF STUDENTS					
13.PREREQUISITES					
14. NO. OF COURSES IN PROGRAM					
15.METHOD OF DELIVERY/MEDIUM					
A. ASYNCHRONOUS					
B. SYNCHRONOUS					
C. BOTH SYNC/ASYN					
16. LINKS TO RELATED SITES					
17. SEARCH ENGINE.					
18. INTERNAL KEYWORDS					
19.TEACHING AIDS					
20.PICTURES/GRAPHICS					
21.FILMS					
22.AUDIO COMPONENT					
23. INTERACTIVE COMPONENT					
24.ORIGINAL URL?					

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