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EVALUATION OF A TEACHERS' TRAINING WEB SITE BASED ON INSPECTION AND LOG ANALYSIS.

Hara Giouroglou, Anastasios Economides
PhD Candidate Ass. Professor
University of Macedonia, Thessaloniki, Greece.
hara@uom.gr economid@uom.gr
SHORT PAPER

SUMMARY
The abundance and free publishing on the Web nowadays has revealed the need for in depth evaluation and inspection. This necessity is twice as much important for academic Web sites that aim to provide people with current, accurate pieces of information. The evaluation focuses on a Web site dedicated to an academic trainers community at the University of Macedonia. Our main goal is to provide a thorough evaluation of the EP.E.N.DY.S.H. Website, authored for the needs of the homonymous project on in-service teacher training that runs for two years at the University of Macedonia. Our second objective is to show the site's log analysis results as presented by WebTrends. As a third aim, the paper will suggest future changes that will improve the face of the project worldwide, as the site connects the project with the outside world.

KEYWORDS: Web site evaluation methods, content, visual design, usability, interactivity, searchability.

INTRODUCTION
A two-year project runs at the University of Macedonia, regarding the training of trainers in the Modern Network and Information Systems. For the needs of the project, the EP.E.N.DY.S.H. Web site (http://www.ithaca.uom.gr/) has been created and serves a number of purposes. Firstly, it aims to present the project to the outside world and inform the public about its rationale. Secondly, the site has evolved into an Intranet for the inner operation of the project, in order to facilitate and connect the people involved. Thirdly, it provides "basic" web-based teaching (Karuppan, 2001) in the form of syllabus, lecture notes, reading materials, and assignments delivery. The paper aims to evaluate the site, by means of standard inspection methods and log analysis results.

WEB SITE EVALUATION
The democratic philosophy lying underneath the WWW renders all users free to author a Web site and post it online. Therefore, the Internet becomes an open bank of both quality and trash information that is predominated by anarchy. In order to fully understand this supposition, we need to contrast Web sites with "moderated newsgroups", where all postings are firstly sent to a moderator that evaluates their content before making them public.

The predetermined need of critical Web site evaluation has led scientists, researchers and Web site analysts into the initiation of Web site evaluation methods and evaluation criteria. Evaluation methods are separated into five categories: competitive analysis, scenarios, inspection – including Heuristic evaluation –, log analysis, and on-line questionnaires (Cunliffe, 2000). Baecker et al. (1995) have also mentioned the Cognitive Walkthroughs method, based on the psychology of inexperienced users that allows the detection of likely interface problems. As regards Web site evaluation criteria, there are two different types: evaluation of the site itself and evaluation of the content (EETAP, 1999).

Log analysis uses software solutions to automatically collect and analyze the number of access logs. The results gathered are objective because they are based on primary sources of information – the actual users. However, log analysis cannot build reliable user models. Finally, it is used as an evaluation method during the implementation and maintenance stage. The review of EP.E.N.DY.S.H. Web site is based on log analysis executed by WebTrends solutions and inspection methods, based on established guidelines regarding four major areas of Web site design: content, visual design, usability and searchability. The inspection of established guidelines or checkpoints does not require user groups. This method has a high degree of success, it can be undertaken by a single individual and requires less formal training. One branch of this method is the Heuristic evaluation, a "usability engineering method" that, according to Nielsen (1994), needs to be carried out by a number of evaluators in order to avoid subjectivity in the selection and application of heuristics and involves "discount" user testing (Nielsen, 1995). This evaluation does not use heuristics and it is carried out by an individual scientist.

THE EP.E.N.DY.S.H. WEB SITE
The basic structural points of the Web site, which is an Intranet, consist of a large database system, the user groups and their degree of freedom in accordance with the server security systems of the Intranet and the asp Web site technology that has been implemented with Visual Basic programming tool. The Intranet has been implemented in a Windows NT 4.0 environment, and its operation requires the Internet Information Server 4.0, the SQL Server 7.0 and the Index Server. The developer has not designed the site with the safest HTML standard (HTML 3.2) but only with "the most current version of the popular browsers" (Niederst, 1999) in mind, Explorer and Navigator edition 4.0 and above. The log on security system is implemented with the Windows NT Challenge/Response system, with coded user password.

The Intranet's central end users are separated into three categories: the project trainers, the tutors and the secretary office. At a first glance, the Intranet has a complex structure that serves different purposes, such as the project's time line, online teacher training, instant access to evaluated learning materials, access to external links, communication and discussion. Firstly, it presents general information on the project's structure, rationale, operation, the team of trainers and tutors, the administration and the main objectives of the project. This piece of information is not password protected. Secondly, it provides special information regarding the project's inner operation, the curriculum, the trainers' absences, the tutoring hours per trainer and the trainers' evaluation. This area is password protected for the trainers, the tutors and the secretary office. Furthermore, the Intranet has a special password protected area that allows tutors to post interesting links, evaluate educational software and online learning materials in the fields of social sciences, foreign languages, mathematics, informatics, and music, and post their lectures online. Finally, the site offers communication forms with the project administrator and the secretary office as well as a search option.

EVALUATION RESULTS (INSPECTION)

Content

Content evaluation is affected by a number of parameters, such as the authority, the audience, the context, its accuracy and its currency. Authority measures the suitability of a site's publisher, developer(s) and author(s). On the whole, the Web site is the home page of a university project established under the provision of a reputable academic institution. As far as developers are concerned, EP.E.N.DY.S.H. Web site had a small-scale professional Web development environment. The site was developed by a single expert with professional experience in Web authoring. The development of the site lasted three months and its conversion into an Intranet happened during the following months. Even though the developer is considered to be an authority in this field, the fact that a Web site's development period consists of various sub-areas of importance demands the collaboration of people with a wide range of backgrounds (Cunliffe, 2000). Therefore, content authoring was distributed to individuals from different fields of expertise. The project tutors had the obligation to present their learning materials, notes and lectures in electronic form. These tutors were members of the University's personnel who undertook the responsibility to train the trainers. The evaluators were members of the University's research assistants who collected and evaluated educational software, web-based software, Web sites, mailing lists and print materials. Each evaluator had to cover a specific discipline, e.g. mathematicians were searching for educational software and learning materials for mathematics. We therefore deduct that the authors of the content were also authorities on the subjects they covered.

The contents of the site are categorized in "Hybrid Organization Schemes" (Rosenfeld and Morville, 1998) that include audience-specific, topical, and task-oriented categories. Therefore, users cannot easily construct a mental model, but they need to access each menu item in order to find the desired option. Content quality also depends on the target audience and on the degree it covers the needs of the end users (Elkordy, 2000). The Web site is primarily developed for the project needs and its trainers and secondarily for the wide audience. The purpose of the site is made clear from the fact that most services are password protected. The site offers various services to the trainers. They can access the learning materials and the curriculum, communicate with their peers and administrators, and publish their own work. However, a valuable service that is not provided is trainer-to-tutor communication. The Web site does not include the tutors' e-mails and the trainers do not have the flexibility to access their tutors directly. There is therefore a passive learning paradigm, inferior to its active counterpart (Woodhead, 1991).

The content of an academic Web side depends strongly on quality, quantity, and its readability (McMullen, 2001). Regarding content quality, all sources of information are carefully selected and implemented in terms of subject relevance and authorship. The learning materials are also chosen from a number of reputable sources (books, journals, web sites) and the references are cited in most cases. The external links lead to sites developed by prominent academic institutions, organizations, international companies or individuals who are considered to be authorities. Therefore, there is accuracy in both primary and secondary data, with clearly cited sources.

As regards content quantity, a quick inspection of the site will prove that only some of the learning materials and link categories are rich in quantity. The site has over 100 pages, which justifies the existence of plenty information. Yet, some topics are underdeveloped while others are almost exhausted. Some link categories contain no sources (e.g. "OTHER ACTIVITIES OF ODYSSEIA"), others have only one entry (e.g. "PRIMARY/SECONDARY EDUCATION FOUNDATIONS"), while others have more than 40 entries (e.g. "EDUCATIONAL SOFTWARE COMPANIES"). The same situation is viewable in the evaluation sector where there are 168 entries for Foreign Languages, 139 entries for Informatics, 125 entries for Mathematics, 33 entries for Economics, 15 entries for Social Sciences and 6 entries for Music. In total, some topics are analyzed in depth while others are superficially treated.

An important aspect of Web information systems analysis is the linguistic accuracy of the content (Bauer and Scharl, 2000) syntactically, semantically, and pragmatically. There is no ambiguity in language and the end user can immediately grasp meaning. While the overall impression of the site is good, its English version contains only half of the contents and it is poorly maintained. Though the primary end users of the site are Greek teachers of the secondary education sector who are receiving initial training in order to moderate training sessions in their schools, the site still needs to post its contents in English language. Bearing in mind the fact that the global nature of English language facilitates the dissemination of knowledge worldwide, the poor authorship of the English version may impede the project's appreciation, gratitude and recognition by worldwide academic institutions, affiliate organizations, and individuals.

Visual Appearance

A usable Web site needs to focus on an aesthetically pleasant interface design (Battleson et al. 2001). The format and appearance of a Web site adds to its general attractiveness and communicating nature and depends on principles of design. The effectiveness of a design depends upon the basic Principles of Design, which are balance, harmony, contrast, variety, and action. EP.E.N.DY.S.H. Web site, though simple in layout, has incorporated a number of these principles. The simplicity of the site layout facilitates all users, even those who are not accustomed to view Web sites, to find their way through quickly and easily. The visual center of the home page, which "must always be carefully considered during the initial design stages" (Magnik, 1998), is dedicated to the "Announcements", an area where news are frequently posted.

There is no overuse of color, as the background is white, and there are no more than four basic colors. The use of colour opposites such as orange and blue enhances the contrast in the design, while the white background makes the layout less forceful and tiring for the eye. Yet, emphasis is not clearly stated as there are no clear text rules that differentiate links from texts. Not all links are immediately recognisable as on the home page they are black, while all other links throughout the site are blue. Visited links do not change colour, and the reader cannot easily retrieve the external sites already accessed.

There is hardly any feature of variety on the Web page. This fact renders the site usable on the one hand and dull on the other. The principle of action directs the eye from one part of a design to another and guides it to the important elements of the site. Therefore, the eye of the reader may be selectively directed by careful placement of type, illustration/s or border/s in the design. On the whole, the home page is so simple in design that principles such as variety and action are not exploited.

Usability, Interactivity, Searchability

Usability is a branch of ergonomics and refers to the site's functionality, its appropriateness to the searcher needs (EETAP, 1999) the degree to which it is considered simple, reusable, participatory and effective. The evaluation of usability also measures the degree of compatibility of the system with the users' cognitive characteristics and the easiness of user-interface communication (Benbunan-Fich, 2001). For that reason some researchers advocate the primary role of the end user in the forefront of the design process (Abels et al. 1997). The importance of adapting the interface into the end users' needs is also recognized by the academic community (Abels et al. 1999). According to Nielsen, the hypertext should be easy to learn, efficient to use, easy to remember, pleasant to use, and error-free (Nielsen, 1995). EP.E.DY.S.H site meets the needs of its users, as it is simple in layout and rich in content. Experienced and novice users can easily navigate without getting lost as the clearly identifiable navigation buttons on the banner are always present to return the user to the home page. The easy move from one page to the other is also enhanced by the speed of loading which is very high, due to the fact that no page contains graphics or multimedia applications, that slow down operations (Terplan, 1999). The direct links to the communication area and to the dialogue areas enhance interactivity and human computer interaction, constituting the exchange of public relation messages a user-friendly activity (Hallahan, 2001).

The site can be immediately viewed by most browsers such as text-based browsers or screen readers as the speed of loading is high and there is no overuse of graphics, dynamic HTML or multimedia presentation. The site can also be displayed on monitors of various types and resolutions as the page width fits without horizontal scrolling on small, low-resolution monitors.

Though multimedia denote the free-form expression of ideas and relationships (Balasubramanian, et al. 2001), they are not incorporated into the Web site. The site's hypertext is a simple a network of nodes connected by links. The user can easily explore and select any piece of information in a non-linear way, as hypertext corresponds to human cognition and facilitates exploration (Balasubramanian, 1994).

One could separate the page in three equal rows of information, with the banner centered on the top of the page and the navigation buttons on the upper left side. The banner at the top of the page facilitates the user's orientation and awareness concerning his/her presence on the specific site. Apart from that, the external links do not open on a new window and the project's banner is always present at the top, in case the user wants to return to the home page. The page footer is centred at the bottom, uses lower case and refers to the page's authority. The users can communicate with the Webmaster and can also get informed for the last update.

The increasing amount of information available on a Web site renders obligatory the existence of an information retrieval search engine (Savoy and Picard, 2001). The keyword search function is considered a bonus for a Web site (Schrock, 1999). The degree of the EP.E.N.DY.S.H site searchability is very low. There is no site map that will help the user orientate through the site and extract pieces of information. However, this misfortune is neatly balanced with the simplicity of the page layout that does not frustrate the user. The most important weakness of the site is the inappropriateness of its search engine. One of the navigation buttons on the banner links the site with the search engine of another site of the University that serves the needs of a computer lab. The search engine cannot detect key words that relate to the EP.E.N.DY.S.H. site contents or subject area, rendering it totally useless and therefore redundant.

EVALUATION RESULTS (LOG ANALYSIS)

It is very important to view the statistics of a Web site, as developers may track how many visitors go on a Web site and what they have the tendency to look at the most in order to develop a better understanding for their target group's needs. The site can then be adjusted and adapted to these needs accordingly. Log analysis results can lead to improvements to problematic areas in order to keep people visiting the site and remain interested in the content. The Web-site traffic analysis has been executed with WebTrends Log Analyser, a web traffic analysis software package, configured for single-server web sites.

WebTrends executed a three month traffic analysis (March, 2000 – June, 2000) for the Web site logs from the computers of the University of Macedonia and of the Lab where the 20 trainers had their personal computers.

During that time, the site was accessed by 20 different IP addresses at the University of Macedonia with a total number of 4,478 hits and a total number of 284 visitor sessions that is the total hits for one visitor of a web site. Accordingly, the trainers' Lab, with 20 IP addresses, noted 1,154 hits and 341 visit sessions. The results show a qualitative and quantitative difference. There was a site overuse in the trainers' lab regarding the visit sessions compared to the visit sessions noted by the university. Yet, the trainers did not note many hits per session. Instead, they made more frequent use of the site.

In terms of reliability, only the 0,13% of the total hits from the University of Macedonia's IP addresses failed. In the trainers' lab a server or client error occurred in the 0,25% of the total hits. The percentages regarding server and client errors are very low and confirm the reliability and adaquate maintainance of the site.

The third log analysis of the site lasted for a year (March, 2000 – March, 2001) and measured the site traffic from IP addresses out of the University of Macedonia. In one year, EP.E.N.DY.S.H. site had 895 visitor sessions with 1,427 hits. Therefore, the avarage number of hits per visitor session is 1 to 2. We deduce that users visiting the site outside of the University of Macedonia did not dedicate much time in viewing its pages. At this point, it is important to remind the fact that most of the pages are password protected for a limited number of end users. Secondly, the English version is underdeveloped and cannot easily persuade foreign visitors. Concerning reliability and maintenance, only 2,39% of the total hits failed, the majority of which were 404 Page or File Not Found client errors.

OVERALL EXPERIENCE AND CONCLUSION

The overall impression of the Web site is good. The content is carefully selected and authored by a team of experts. Yet some topics are underdeveloped, while others are better analyzed. In terms of visual appearance, the interface is simple and plain in color and graphic design. The degree of usability is also high both for novice and experienced users. Yet, its main disadvantage is the unsuitability of the search engine as well as the inadequate attention given to the English version. One could argue that the site is an intranet that mainly serves the needs of the trainers, the tutors and the secretary office of the project, and, therefore there is no need to cater for external users. However, this assumption is unrealistic, since it is very important for the project to "show a good face" worldwide. Therefore, as Nielsen suggests, it is better to use two different styles and two different sets of templates for the Intranet and the external Web site (Nielsen, 2000). The log analysis results prove that the site is not thouroughly accessed by external IP adresses, and when accessed the sessions were very short. To conclude, EP.E.N.DY.S.H. is an easy-to-read Web site, simple in layout and graphic design, that avoids visual confusion and gives importance in content rather than visual appearance. After all, this is an academic, profit-free site that aims to inform rather than to persuade.

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