

Pedagogically-Oriented Evaluation Criteria for Educational Web Resources

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Summary

Online databases with educational resources for the needs of primary schools demand an objective evaluation of the information provided, the raw material of knowledge, the basis of an exploratory understanding of the world by the students. Resource evaluation is thus vital in the development process of such databases in order to serve as high-quality repositories of learning material for teachers and students.

Within this framework, a research project carried out at the University of the Aegean in Greece has established an extended list of criteria for the evaluation of educational resources on the web, based upon the analysis of school teachers and postgraduate students. In this paper, we present the evaluation criteria list and the underlying methodology behind this system.

In our work we focus on the learning and teaching process, considering evaluation through a pedagogical approach and a media-didactic theory. Therefore, web resources able to support active learning by using various media elements, are considered as quality content. We focus on the learning and teaching process and we approach quality as the potential educational value of content.

One of the main conclusions of our study is that, instead of the adaptation of an un-feasible “universal” quality evaluation model for all domains of interest, due to the huge heterogeneous amount of information on the Internet, it is preferable to use evaluation models per sector (i.e., education, economy, culture, etc.) during the whole content’s life-cycle.

This paper also presents some interesting findings about teachers’ attitudes and media competence based on the outcome of the focus groups.

Keywords: content evaluation, educational content, teachers evaluation, quality content, educational resources, evaluation criteria, quality control

1 Introduction

The World Wide Web is a repository of content (files, databases, datasets, images, video or audio clips, simulations, animations, etc.) of all known formats and standards that teachers and students can utilize for their educational needs, and it is structured not as a huge database but rather as a global network for communication, interaction and sharing. But the excessively increasing load of information production and routing within the Internet leads to an inevitable *overload* of useless information, information for *commercialization* purposes, i.e. product promotion and information *modulation* according to certain ideological and political perceptions, thus raising certain criticisms concerning the pedagogic value and relevance of the Web.

According to Luhmann (1996), this accumulation of information follows a non-systematic pattern because the organization and presentation of information on the Web is quite different

than those taking place within the classical Media. Within the online context, the user can be a content “producer” and “consumer” simultaneously (Kron, Sofos, 2007), thus leading to a huge amount of raw information, produced by a huge number of heterogeneous users without any didactic reformation applied and incapable to support classroom learning design. Within the classical Media context, committees of experts control and approve the quality of content. Moreover, within the education sector, there is always a quality control procedure taking place against the educational material of the schools from the Ministry of Education.

Thus, taking into account this primary difference between classical and new media, evaluation of information resources is a basic requirement for content published on the web.

There are two distinct approaches to this:

- If the reference point of our analysis is *accessibility for all*, then we can set, for example, broadband access at the top of the evaluation checklist, especially for groups of people living in isolated places. Moreover, we can set as a priority, the conformance with the W3C standards (WAI, 2009). At this level of analysis, we can also take into consideration various typical requirements that classical media must conform to.
- On the other hand, if we focus on the *learning and teaching process*, then we have to consider evaluation through a pedagogical approach and a media-didactic theory and so, web resources able to support active learning by using various media elements, are considered as *quality content*. Evaluation of quality thus refers to the accurate substantiation of web resources based on specific criteria aiming to specify the potential educational value and usage of this resource as a quality metric. Criteria can be either *objective*, based on actual web sites properties (e.g. identity, media elements, authority, etc.), or *subjective*, based on teacher’s perception about quality of web content, experience, skills, etc., or a *combination* of both. The term “*educational*” refers to the relation between the quality metrics and the learning process, the media elements and structure, the active participation of students, their learning status feedback, etc.

In this context, in the department of Primary Education at the University of the Aegean in Greece, we focus on the learning and teaching process and we approach quality as the potential educational value of content.

Our research aims at the development of a valid and applicable evaluation list as a practical tool for the teachers, especially in primary education, in order to enhance their classroom teaching. In this paper, we quote the methodology we adopted during the last 2 years and present the extended criteria list as the main outcome.

2 Research Framework

2.1 Aims

- **Investigate** (a) how active teachers evaluate educational resources on the web in order to enhance classroom teaching, (b) if they are using objective criteria or not and (c) the correlation level with the criteria used by other colleagues.
- **Design** an evaluation criteria list for educational resources on the web and a pilot usage of this list in real case scenarios, in order to optimize them via an adaptive process.

2.2 Methodology

Our work followed an *exploratory qualitative* methodological approach (Cohen, Manion, 1994). By interpreting the outcomes of the contacted focus groups, a number of interesting outcomes were revealed concerning teachers and their (a) degree of familiarization with online educational resources, (b) methods in order to use the resources, (c) subjective evaluation criteria. A meta-analysis of outcome (c) revealed that there were common criteria (such as information validity, content quality, etc.) used among the participants and as a follow-up task

teachers were asked to document their own criteria and use them in order to evaluate a given number of educational resources on the Web.

In general, our research was broken down into four discrete phases, covering a period of 4 academic semesters (2007-2009) where more than 100 teachers (Primary Education) and postgraduate students (Department of Primary Education, Postgraduate Studies in Education and New Technologies) actively participated:

- i. Bibliographic Review and Preliminary Analysis
- ii. Development of Criteria List
- iii. Real case Evaluation Scenario
- iv. Refinement of Criteria List

3 Bibliographic Review and Preliminary Analysis

During this phase, investigation of the way in which teachers evaluate web resources took place, thus resulting in a list of non-objective criteria. The focus-group method was chosen in order to facilitate the checking of participants' ideas and thoughts, or even more to extract teachers' attitudes towards new trends in educational technology. The results of the focus-groups' questionnaires were analyzed and systematized with the participants, in order to provide feedback from the entire process.

Criteria	Bibliographic References											
	1	2	3	4	5	6	7	8	9	10	11	12
Accuracy	√	√		√		√	√	√				
Authority-Authorship-Author-Provider	√				√	√			√	√		
Objectivity	√	√		√	√	√	√			√		
Up to Dated	√	√		√	√	√	√		√	√		
Content	√								√		√	√
Design	√										√	
Accessibility	√	√			√							
Validity		√										
Coverage		√		√		√	√		√			
Density		√										
Reactivity		√										
Usability			√									
Functionality			√						√			
Reliability			√					√			√	
Effectiveness			√									
Aims					√					√		
Suitability					√							
Responsiveness					√							
Clarity					√							
Logic								√				
Support								√				
Stability									√			
Additional Content/References									√			√
Graphics									√			
Style									√			
Credibility										√		
Selection										√		
Technical Properties											√	
First Impression												√
Quality												√

Table 1: Criteria categories and frequency of use (Sofos, Kostas, 2007)

Additionally, bibliographic research was conducted, in order to locate various evaluation criteria for web sites, educational content, educational software, etc. and revealed the great efforts worldwide in order to establish evaluation mechanisms to qualify and certify online content. Based on the most important bibliographic references that we traced and analyzed, we outlined the main criteria categories and usage frequency in Table 1:

1. (Unesco, 2002)
2. (Dragulanescu, 2002)
3. (Olsina,Lafuente,Rossi, 2001)
4. (Beck, 2006)
5. (Lesley University, 2005)
6. (Kapoun, 1998)
7. (Kaskantami, 2006)
8. (Harris, 1997)
9. (McInerney,Bird, 2005)
10. (NetSchoolBook, 2006)
11. (Payton, 1997)
12. (McLachlan, 2002)

Moreover, during the preliminary analysis, various quality control schemas were investigated because even though there are initiatives within the educational sector towards quality control, there is no agreement about the evaluation criteria or methodology. We quote the following approaches:

- **International Standards:** For example, the Minerva Quality Principles (MINERVA, 2009) that qualifies content, focusing on cultural web sites, according to the following criteria: 1) Transparency, 2) Effectiveness, 3) Maintainability, 4) Accessibility, 5) User-centered, 6) Responsiveness, 7) Multi-lingual, 8) Interoperability, 9) Manageability, 10) Preservation.
- **Control Lists/Rating Tools:** Check-list oriented evaluation tools, originated from educational software evaluation methodologies which were based on criteria that control various educational dimensions of the software, such as pedagogical properties, content quality, relation between content and school analytical programs, design, functionality, etc. This approach uses a set of predefined questions in order to evaluate quality of web resources, such as educational aims, didactic, structure, media elements, design and navigation, maintenance, methodology, learning support, cost, copyright issues, etc. (Engel, Klein, 1999).
- **Certification:** This process is quite new within the educational sector. It is used mainly in the context of pilot studies or funded research projects, where a group of experts is gathered in order to evaluate, qualify and certify educational resources or programs, thus acting as a third-party certification authority.
- **Educational Portals:** Specialized web sites with repositories of substantiated and annotated educational resources, with content and services for schools, teachers and students. This category includes national initiatives for the support of the educational policy with the New Media, funded research initiatives and also various private initiatives.

4 Development of Criteria List

During this phase, various criteria were developed (Sofos, Kostas, 2007) as basic guidelines for the teachers to recognize, distinguish, review, evaluate and annotate content in order to qualify its potential educational value.

We outline below the 4 basic categories:

- **Functional** Evaluation, which involves the process of checking web resources against high level quality assurance indicators (with specific properties and characteristics), such as authority, navigation, media elements, transparency, and accessibility.

- **Educational** Evaluation, which involves the process of checking educational aspects (i.e. specific properties and characteristics) of web resources, such as target groups and educational levels, content and educational framework, site structure relative to its educational impact, presentation means and technologies.
- **Didactic** Evaluation, which involves the process of checking didactic aspects (with specific properties and characteristics) of web resources with respect to potential didactic reformation by the teacher, such as teaching models, learning models with new media, school analytical program, learning situation to be mediated by the teacher.
- **Descriptive** Evaluation, which involves the process of referring to the potential didactic reformation of the web resources and focus mainly on the educational process and the requirements for a successful adaptation of content, such as content rating, personal (non-objective) evaluation and potential applicable teaching plans in respect to the corresponding resource.

5 Real Case Evaluation Scenario

Based on the previous preliminary results, a first draft of the evaluation criteria check list was developed, in order to be integrated into an electronic environment of information organization, aiming to study alternative means of communication among teachers (Sofos, Kostas, 2007b). For research purposes, a pilot implementation including collaborating discovery, study, evaluation and substantiation of web resources by the teachers has taken place. During this pilot implementation, participants inserted more than 1.200 substantiated and evaluated web resources of the Greek domain (.gr) into the repository. Next, a questionnaire was used in order to imprint teachers' attitudes and experiences towards using the evaluation criteria list, its applicability, functionality and added value in a real world scenario. Analysis of the results led to the refinement of the criteria list.

6 Criteria List

I. Education	II. Didactic Evaluation	III. Functional
A. Content	A. Media Operation	A. Functionality
A.1 Quality Elements A.1.1 Authenticity A.1.2 Objectivity A.1.3 Credibility/Validity A.1.4 Documentation A.1.5 Relevance A.1.6 Sufficiency A.1.7 Polymorphism/Multiplicity A.1.8 Accepted Expressive Language A.1.9 Interdisciplinary Approach A.1.10 Syntactical and grammatical Accuracy A.1.11 Help/Use Guides A.1.12 Collaboration A.1.13 Active Participation / Interaction A.2 Inappropriate Content (Yes/No)	A.1 Usage A.1.1 Educational game A.1.1.1 Entertainment A.1.1.2 Educational orientation A.1.2 Drilling A.1.2.1 Drilling exercises A.1.2.2 Consolidation exercises A.1.3 Teaching A.1.3.1 Visualization A.1.3.2 Distance teaching A.1.3.3 Tutoring with feedback A.1.4 Communication/Collaboration A.1.4.1 Information (news) A.1.4.2 Opinion exchange A.1.4.3 Collaboration A.1.4.4 Database A.1.5 Learning A.1.5.1 Exploration A.1.5.2 Simulation/Experiment A.1.5.3 Construction tools A.1.5.4 e-Learning	A.1 Authority A.1.1 EU A.1.2 Ministry of Education A.1.3 Educational Organization A.1.4 School A.1.5 Academic Initiative A.1.6 Private Sector Initiative A.1.7 Publication Sector A.2 Navigation Structure A.2.1 No navigation A.2.2 Paragraphs A.2.3 Menu A.2.4 Sitemap A.2.5 Hyperlinks A.2.6 Search Engine A.2.7 Smart Navigation A.3 Media Elements A.3.1 News A.3.1.1 Newsgroups A.3.1.2 RSS feeds A.3.1.3 Downloads A.3.1.4 Databases A.3.1.5 Advertisements A.3.2 Entertainment A.3.2.1 Entertainment Games A.3.2.2 Educational Games A.3.3 Collaboration/Interaction A.3.3.1 Forum

		A.3.3.2 E-Collaboration Environments A.3.3.3 Shared Workspaces A.3.3.4 Web-blog A.3.3.5 Wiki A.3.4 Communication A.3.4.1 Email A.3.4.2 Chat A.3.4.3 Mailing List
B. Structure	B. Potential integration of resource into the classroom teaching (scenario of usage)	B. Effectiveness/Accessibility
B.1 Layout B.1.1 Paragraphs B.1.2 Balance between textual and visual elements B.1.3 Balanced interconnection between textual and visual elements B.1.4 Attractive content presentation (aesthetic) B.1.5 Grading of content B.2 Potential added value against other means (Yes/No)	B.1 Target group of students B.2 Learning objectives of selected content B.3 Teaching method B.4 Integration timeline B.5 Expected outcomes	B.1 Access Status B.1.1 Free B.1.2 Payment B.1.3 Mixed B.2 Alternative Means of Content Delivery B.2.1 PDA B.2.2 Mobile Phones B.3 Compliance to W3CWAJ Standards (Yes/No) B.4 Plug-ins needed (Yes/No) B.5 Online Collaboration (Yes/No) B.6 Multilingual Content (Yes/No)
C. Educational level	C. Posteriori observations (comments about the usage)	C. Transparency
C.1 Kindergarten C.2 Primary school (1-2) C.3 Primary school (3-4) C.4 Primary school (5-6) C.5 Intermediate school C.6 High school C.7 Technical school C.8 University C.9 Life-long learning	C.1 Process effectiveness C.2 Students reaction C.3 Concluding remarks to other teachers	C.1 Author/Editor Declaration (Yes/No) C.2 Aims/Target Declaration (Yes/No) C.3 Author/Webmaster Contact Info (Yes/No) C.4 Legal Notice (Yes/No) C.5 Privacy Policy (Yes/No) C.6 Content Update Date (Yes/No) C.7 Target Group C.7.1 Teachers C.7.2 Students C.7.3 Parents C.7.4 No target group
D. Content Elements		
D.1 Text D.2 Links to external content D.3 Photos D.4 Animation D.5 Cartoons/Closed Simulation D.6 Video D.7 Simulation D.8 Sound D.9 Online exercises D.10 Hyperlinks		

Table 2: Extended evaluation criteria list

6.1 Discussion

One of the main conclusions is that, instead of the adaptation of an un-feasible “universal” quality evaluation model for all domains of interest, due to the huge heterogeneous amount of

information on the Internet, it is preferable to use *evaluation models per sector* (i.e., education, economy, culture, etc.) during the whole content's life-cycle.

Based on this assumption, our research focused mainly on the evaluation methods for web resources under educational and didactic perspectives. Three basic categories were designed according to three concrete levels of evaluation: Functional, Educational and Didactic. An evaluation criteria check-list was developed for the needs of primary education teachers. Moreover, a pilot project for the development of a repository of substantiated and evaluated web resources took place among the participants using the criteria list.

Regarding the Greek domain (.gr) our research revealed that there are a relatively small number of web resources able to be qualified according to our criteria, especially concerning usage of multidimensional media elements. This result confirms a less positive attitude of the active teachers towards a potential didactic improvement of web content (as it was recorded by the questionnaires and the focus groups) and that this attitude relates to the media competence level of the participants.

More specifically, the focus groups revealed the following:

- Teachers recognize the value of educational web resources.
- Teachers do not integrate web resources into classroom teaching or they use them sporadically.
- Educational web resources, as references inside school books, were found to be quite few and so was the media competence level of the teachers, on a functional level (Kron, Sofos 2003).
- Teachers use evaluation criteria very rarely, while they do not take into consideration some specific characteristics of electronic and multimedia content.
- Teachers pay more attention to validity of the content and its relevancy to the educational program, and not on aspects such as the multimodal and flexible presentation of content or the ergonomical design of the web page.

Finally, according to the development of the pilot repository, the positive attitude and overall participation of the teachers and postgraduate students lead to an extension of the project in the context of an extensive refinement and proofing of the criteria, via teachers participation within a community of practice.

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