**A Rubric for Evaluating Web-Based Learning Environments**

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**Abstract**

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| *With the vast improvement and advancement in the field of constructing Web sites, especially when the technological tools became so user friendly, many teacher educators are designing and constructing their own educational Web sites. These teachers as designers of Web-based learning environments aim to provide quality learning opportunities for their students anytime and anywhere. To achieve their goal they seek an answer for the question: What Web site characteristics are associated with a quality online learning environment? This article defines four evaluation criteria of Web-based learning environment: Usability, content, educational value and vividness. For each criterion we characterized several sub criteria and built a rubric for evaluating Web-based learning environments. This rubric can help teacher educators evaluate the Web-based learning environments they design or those they refer their students to them. It can also help designers through the planning and construction process, by providing an outline that guides them and set in front of them the required components and the expected quality levels that guarantee a successful and effective Web-based learning environment.* |

Recently, we witness a wide and fast technological development among the Arab schools in Israel. This development has raised rapidly the number of educational Web sites built by educators in the schools and pre-service teachers in the teacher training colleges. Several colleges offer courses in the field of constructing Web sites from the technological side. At the same time, these colleges offer also courses that apply technologies to construct educational Web sites based on the pedagogical model of web-based learning environment, in support of instruction in the students' subject matter during and after their teacher preparation program. Also in-service teachers attend complementary courses that help them compose web-based learning environments to support the learning/teaching process in their field.

Many educational Web sites were launched recently covering diverse subjects in many fields, but unfortunately only few of them are worth using. Therefore, educators are required to take a moment and think deliberately before using or constructing any educational Web site. When searching for suitable educational Web sites, teacher educators should initially evaluate the site's potential and effectiveness before using it or referring their students to it. They should be sure that "*the educational Web sites being used as part of their classroom instruction are appropriate and effective in their intended outcomes and goals*" (Furner & Daigle, 2004: p. 61). The designers and developers of educational Web sites are expected to be updated with the research on evaluation methods and criteria in order to consider them when building educational Web sites. In addition, they should exhibit their Web sites to be evaluated by others, so that they can identify the strengths and weakness of their Web sites to make useful changes and improvements (Andrews, 2001). The importance of evaluation can be best described by the saying of Goldman & Bendoly (2003): "*Evaluation can be scary, because a project with unclear objectives and no evaluation can always be described as successful*" (p.3).

Evaluators of Web sites should not be only experts, researchers, or specialists in the domain of educational Web sites (Chen & Brown, 2000; Martindale, 2001), but they can also be non-experts, students, or novice users in general (Collings & Pearce, 2002; Jenkins & Robin, 2002; Tilloson, 2002). The main purpose of the experts’ evaluation is to provide an evaluation of Web sites based on literature criteria, on the other hand the main purpose of the non-experts’ evaluation is to provide an evaluation of Web sites based on personal and informal criteria (Bunz, 2001).

**Web-Based Learning Environments**

The Internet can serve many several educational functions. Martindale et al. (2001) examined one hundred ninety-five “*exemplary*” educational Web sites and distributed them according to their functions into thirteen categories: instructional, content collection, archive/database/reference, compilation of online learning activities/games, collection of links, online exhibit, teacher resource, vicarious participation, research/curriculum project, communication community, place with public mission, academic or research organization and commercial. Midouser and Nachmias (2002) classify these functions in more abbreviated categories: content delivery - accessing on-line journals, libraries, and databases; instruction delivery - supporting lesson plans and learning units; communication support - offering powerful interaction means such as e-mail, forums, group teleconferencing; and creation support - enabling the user to create his own web units and publish them. Recently, McNaught & Lam (2005) grouped educational Web sites into other four main categories: content-rich sites, communication-rich sites, assessment-rich sites, and sites that provide support functions for teaching and learning.

As we see, many variables, dimensions, features and categories have been defined in order to present characterizations of high quality Web-based learning environments. These characterizations set the bases also for the criteria of evaluating Web-based learning environments. In this article we considered any educational Web site constructed by educators (pre-service or in-service teachers) who attempt to wrap together knowledge in specific content areas and technological features in pursuit of learning goals, to be a **Web-Based Learning Environment**. As for the characterization of a successful and high quality Web-based learning environment we define those in the evaluation method that we suggest.

**Evaluation Methods**

According to Bunz (2001), there is a difficulty in assessing a Web site since the process of evaluation seems to be subjective and internal, and is not based on objective criteria. *"While the literature on evaluating educational Web sites is extensive, the vast majority of this has been summative in nature, delivering criteria that instructors and students can use to decide whether or not to use or ignore the Web site as a source of information"* (Greenhow et al., 2006: p. 22). However, several methods of evaluating Web sites were presented in the latest literature: writing essays evaluating the Web site (Tilloston, 2002), establishing think aloud protocol – a verbal protocol of the Web site users' thoughts occur while they undertake a task in the Web site (Bunz, 2001; Greenhow et al., 2006), using a checklist of questions based on criteria or a heuristic list (Collings and Pearce, 2002; Goldman & Bendoly, 2003; Greenhow et al., 2006; Karoulis & Pombortsis, 2001; Tilloston, 2002), submitting web-based survey developed specifically to measure the user perceptions of the Web site value (Jenkins and Robin, 2002; Alpar, 1999; Hsu, 2006), analyzing Web site traffic in a way that determines automatically demographic information about site users (Greenhow et al., 2006). Nevertheless, these techniques of evaluation provide to the constructor or the teacher educator as a designer of an educational Web site a general impression about its effectiveness, but do not pinpoint professionally and objectively the weaknesses in order to start a process of improvement. Unfortunately, "*Much less has been written on formative tools to evaluating educational Web sites that provide information to designers in their planning and development of a Web site*" (Greenhow et al., 2006: p. 22).

***Rubric***

Furner & Daigle (2004) suggest that "*educators need to use well constructed evaluation methods for seeing that the software and Web sites they want to use are suitable for our students*" (p.64). If we take a look at the modern methods of evaluation in the educational process, we notice that recently several educators are using new tools to evaluate the performance of their students in different educational tasks. The most modern and popular tool in the educational research is the "rubric" (scoring guide). It is a clear and easy to use table that helps teachers evaluate the work of their students and assists students to appraise their work and identify the expected level of performance they are obligated to reach (Boston, 2002; Crawford, 2001). This tool is used recently to evaluate web-quests tasks, but it is not popular yet in the field of evaluating Web sites in general and educational Web sites in specific.

In spite of its lack of popularity in the field of evaluating Web sites, we suggest that the rubric may be a useful tool for this purpose. A rubric goes beyond the evaluation tool of checklist since it does not only specify the desirable features one would want to see in an effective Web-based learning environment, but it characterizes these features and details the levels of applying them in the Web site. "*While using checklist criteria to evaluate the pedagogical design of Web-based learning environments can be useful for generating formative feedback and assisting content analysis, the disadvantages of applying a checklist include the tendency toward oversimplification or inaccurate categorization depending on the evaluator's training and knowledge"* (Greenhow et al., 2006: p. 25-26). On the other hand, a rubric can specify the best/worst expected quality of each criterion in the pedagogical design of a Web-based learning environment, which makes the evaluation less dependant on the evaluator's background and more objective and formative.

We developed a formative evaluation tool – rubric – to help pre and in-service teachers evaluate the quality, pedagogical design and the potential of the Web-based learning environment they use as a resource for supporting learners' growth. It can also serve as an outline-efficient model when designing such site. Applying this rubric through the process of designing and constructing a Web-based learning environment would improve the quality of the outcome. On the other hand, it would provide information to teacher educators on the educational sites they review for their students' use.

To generate a useful and practical rubric, we searched for the most objective and popular criteria in the domain of evaluating educational Web sites in order to reduce also the level of subjectivity in the process of evaluation. The proposed rubric contains four main criteria: **usability, content, educational value,** and **vividness**. We also added to each main criterion several appropriate sub-criteria to cover various aspects of it. Then we determined the weak, median, and excellent quality level for each criterion. This determination of quality levels increases the likelihood of getting the same score of assessment by different evaluators (Moskal, 2000), which makes the evaluation more effective and objective.

**The Rubric Evaluation Criteria**

***Usability***

Goldman and Bandoly (2003) claim that evaluating a Web site means primarily testing the site's ease of use. The term used to indicate the ability to easily use a certain Web site is the *usability* (Bunz, 2001). A usable Web site is one that is easily navigated allowing users to find the information they are looking for, while also being visually pleasing and enjoyable to visit (Freed, 2003). According to Andrews (2001), site design should be aimed at simplicity above all else. Ease of use is important for a Web site since it enables visitors to make use of it, and get the information they need. Otherwise users will quickly leave the site and move to another one (Alpar, 1999; Freed, 2003).

Alpar (1999) believes that users must be repeatedly attracted to the Web site by being offered entertaining features. These are features that make the Web site enjoyable and fun such as the presence of humor and multimedia (Zhang and Dran, 2001). Bunz (2001) proposed a pleasure framework that can explain what kind of pleasure people enjoy in Web sites. The framework indicates that users experience psych-pleasure from technologies that are easy to learn and easy to use when searching for information they need. However, Midouser and Nachmias (2002) found that educational Web sites make little use of multimedia.

Zhang and Dran’s (2000) real challenge was to develop design factors that can make a Web site usable and serviceable to avoid users’ frustration or dissatisfaction, attract users to a Web site, maintain their interest in the Web site, and encourage them to return to the Web site again. For that purpose, the researchers used Herzberg’s theory (1987) that is based on the importance of creating a motivating workplace. Herzberg found that certain characteristics tend to be consistently related to job satisfaction and others to job dissatisfaction. Zhang and Dran (2000) used the workplace as a metaphor to the web environment and proposed accordingly a two-factor model for Web sites: hygiene and motivator. Hygiene factors are the ones whose presence makes a Web site useful and serviceable, whose absence causes user dissatisfaction. Motivator factors, on the other hand, are those that contribute to user satisfaction, and their absence will leave users feeling neutral, but not necessarily dissatisfied as would the hygiene factors. In their study, the participants identified several hygiene factors: privacy and security, technical aspects and navigation. The factors that were identified as motivators were: cognitive outcomes, enjoyment and credibility.

Other categories that may affect Web site usability are content and design (Bunz, 2001). A poorly designed Web site generally will not retain visitors long enough to pursue content. The term usability is also called in the literature “*user friendly*” (Andrews, 2001; Chen and Brown, 2000). In Andrews (2001), user friendly means two things: firstly, the logo of the Web site is expressive of the message to be conveyed; secondly, the format is visually pleasing, neat, easy to access information and easy to read. Furthermore, the information in the Web site should be written specifically for the web (Jenkins and Robin, 2002; Karoulis and Pombortsis, 2001). Information that is taken from print sources should be rewritten for use on the Web site in order to improve readability. Tweddle et al. (1998) defines readability as a combination of words, sounds, and images in a way that best conveys meaning. Chen and Brown (2000) expand more the characteristics of “*user friendly*”: the purpose of the Web site is clear; the structure is clear, intuitive and the homepage has a well labeled table of contents; links are accurately described and operate efficiently.

As we see, many components may affect the usability of the Web site, but some of these components were mentioned and described by several researchers. Therefore, we chose those ones as sub-criteria for the usability criterion, and provided characterization for each one of them in table 1.

Table 1: **Usability Criterion**

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| --- | --- |
| **Sub-Criterion** | **Characterization** |
| Purpose | The purpose, benefit and importance of the Web site should be presented clearly. |
| Homepage | The homepage constructs the first impression of the user about the Web site. Therefore, it should include a well-labeled, clearly defined table of contents. |
| Navigation | Navigation concerns features related to moving around in the Web site. Users need to know where they are, where they have been, and where to go next. |
| Design | Web pages have to be neat, simple and not overstuffed, and background shouldn't interfere with text. |
| Enjoyment | Enjoyment is caused usually by the use of humor and multimedia, which attract the users and make them understand the subject matter of the Web site enjoyably and easily. But, multimedia should be relevant, clear and appropriate to the subject. On the other hand, the multimedia shouldn't be heavy in a way that slows down the presentation of the web pages. |
| Readability | The ability to easily read and understand the content of the Web site by proper use of text, sounds and images. |

***Content***

Content refers to either knowledge (Nachmias et al., 1998; Nachmias & Midouser, 2002) or information (Alpar, 1999; Jenkins and Robin, 2002; Tweddle et al., 1998). “*Web sites are first and foremost interactive storehouses for knowledge*” (Nachmias & Midouser, 2002). A large number of people use Web sites to fulfill their desire to seek information and know more about their environment. This desire is perceived as a cognitive need people have. “*Cognitive needs result from the desire for information in an increasingly rich society*” (Bunz, 2001: p.5-6).

In Tilloston’s study (2002), most of the respondents said that they always or often find inaccurate information on the web. Users who rely on the reputation of the organization to provide reliable information will most likely assume that information is correct (Jenkins and robin, 2002). Examples of sites that would be rejected because of the author were “*just someone’s web pages*” and “*perhaps a student’s essay*” (Tilloston, 2002). Hsu (2006) believes that "*instructors are in the best position to choose content, because of their subject-matter expertise*" (p. 233). In addition, the level of information provided should be suitable and appropriate to the target users, relevant to the main topic (Tilloston, 2002) and sufficient (Karoulis and Pombortsis, 2001). In table 2 we included the sub-criteria for the content criterion and provided characterization for each one of them.

Table 2: **Content Criterion**

|  |  |
| --- | --- |
| **Sub-Criterion** | **Characterization** |
| Authority | Information in the Web site should rely on authentic organizations and dependable resources in the field of the presented material. |
| Accuracy | Information should be accurate and based on factual knowledge and professional thinking. |
| Relevance | The information provided ought to focus on the main topic of the Web site, and shouldn't include irrelevant or marginal data. |
| Sufficiency | The amount of information in the Web site should be sufficient but not excessive. |
| Appropriateness | The information should be presented in an appropriate method and suitable level of difficulty to the target users. |

***Educational value***

The educational value is an essential component of the Web-based learning environments. It determines the process and the outcome of the students' learning, and helps answering the following questions: Who guides the process of learning? Is it the student, the teacher, or both? Will students learn individually or collaboratively (Nachmias & Midouser, 2002)? What will students achieve at the end? Will they be able to tell the material by heart or construct new knowledge? The answer to these questions is through planning our web lessons and activities. The lesson plan tries to answer the four Wh-questions: who (who is targeted to learn this subject?), what (what subject will be taught?), how (how will student learn the subject? through which process?), why (why students should learn the subject? for what purpose?). A lesson plan contains the learning objectives, the grade levels, and the learning process including materials and activities (Jenkins and Robin, 2002).

Activities help students check their understanding of the material. *“Different activities may pose different cognitive demands, ranging from plain information retrieval, through complex processing of varied types of information or problem-solving and decision-making processes, to creative activity or invention”* (Nachmias et al., 1998: p.9). High order thinking activities challenge learners to think, reflect, and discuss (Chen and Brown, 2000). The results of Midouser and Nachmias (2002) indicate that most sites elicit cognitive processes such as retrieving information (52.5%), and fewer focus on analysis, interference and high order thinking such as problem solving (5%).

Through activities users interact with the environment or knowledge the mediator provides. Besides the activities of answering multiple-choice or open-ended questions, there are other actions that create an interaction between the user and the environment. For example: browsing, pressing a button, and using online tools (Nachmias et al., 1998). The users’ performance in these activities and other actions has to be evaluated through a feedback. The “feedback” tells the user that the designer and coordinator are interested in responding to the needs of the field (Andrews, 2001). Feedback mechanisms can be either an automatic evaluation of the selected answer or synchronic/asynchronic human expert’s response (Nachmias et al., 1998). In complex activities that demand students be inquirer and researchers, a rubric for evaluating the activities should be attached. This rubric should be clear and easy to understand in order to encourage students, and not only teachers, to use it. It should show students the lowest and the highest level of performance.

Other ways of interacting with the environment are through help functions (Nachmias et al., 1998) and search system (Jenkins and Robin, 2002). Help functions are offered in three dimensions: “*technical help in handling tools included in the site, contextualized help in the form of glossary or explanatory information, or didactic help in support of the learning process*” (Nachmias et al., 1998). Search system help users to look for resources that include profound information in addition to the information provided in the site. Some resources may be listed in the Web site itself without a need to look for them.

In addition to interaction with the environment, the interaction with experts and peers is also important. The need to communicate with others in the web is best described through the socio-pleasure theory. According to this theory, people derive pleasure from affiliating with others, connecting, sharing, and being associated with certain groups and their values (Bunz, 2001). The means that support communication in a Web site can be synchronic (chat, video conference) and asynchronic (electronic mail and forums) (Nachmias et al., 1998). In Nachmias and Midouser’s (2002) study, it was found that the communication tool most present in the evaluated educational Web sites is electronic mail (65%). According to Freed (2003), educational Web sites “*are developing as a way to communicate with students, parents, and the community as well as to facilitate instruction and learning*” (p.13).

From the literature review, we see that the educational value is an important part of the Web-based learning environments and it is affected by several factors. We chose those ones mentioned by several researchers as sub-criteria for the educational value criterion, and provided characterization for each one of them in table 3.

Table 3: **Educational Value Criterion**

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| --- | --- |
| **Sub-Criterion** | **Characterization** |
| Learning Activities | Providing learning activities is an essential part of the Web-based learning environments. These activities expose the users to new information that they can use to construct new knowledge and educational substance. |
| Activity plan | Each learning activity should be accompanied with a clear and suitable activity plan that includes: the subject of the activity, learning objectives, characteristics of the target users and description of the learning process. |
| Resources | The activities should include well prepared content presented in various ways, as well as references to additional resources on the web. The users could be directed to resources in specific Web sites or provided with search tools that help them surf the web for further digital content. |
| Communication | Providing the possibility to interact with the designer (expert, teacher) of the Web site and peers through different communication tools (e-mail, chat, forums). |
| Feedback | Tracking the users' performance of each activity and evaluating their work and educational products through a mechanic or human feedback. This feedback encourages the users to improve their performance and gives them the feeling that their work is important and worth detecting. |
| Rubric | Each activity ought to include a rubric to evaluate the users' performances. The rubric must be clear and easy to complete, in order to encourage teachers and students to use it. It should help students evaluate their steps towards performing the activity and knowing what level they should achieve. |
| Help tools | Supplying assistant tools to students in solving problems (technical, contextual, didactical) they face in the process of performing the activities. |

***Vividness***

It was difficult to find a title for this section. We thought about several possibilities such as dynamics, aliveness, or activeness. All of these words convey the meaning of life. Actually, we believe in the importance of having a Web site that is alive, and has the ability to breath. Such Web site receives new and updated information with every inhale and disposes old information in each exhale.

Two technical elements have been chosen in order to keep a Web site alive. The first element is links- the ability of the link to work and to be active when the user clicks on it. Links enable “*mindful travel in the web’s knowledge space*” (Nachmias et al., 1998: p.11). Freed (2003) believes that links are used to reinforce content. Links can be within the site (intra links), to other sites (inter links), or to humans (peers, experts, designer) (Nachmias et al., 1998). When the links operate, they enable users to be enriched by additional information, and to be exposed to people and other sites. Links are the key to use various Web sites; if links do not work we do not have a Web site.

The second element is date- whether the site is up to date or not (Freed, 2003; Tilloston, 2002). When the site includes old information that hasn’t been changed for a while, it loses its worth. Users will think that the site is not living anymore. In educational Web sites, students should feel that learning in the site is updated continuously. There should be always changes, additions, and new things to learn. In table 4 we included the sub-criteria for the vividness criterion and provided characterization for each one of them.

Table 4: **Vividness Criterion**

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| --- | --- |
| **Sub-Criterion** | **Characterization** |
| Links | Directing users to other web pages: in other sites or in the site itself. Connecting them to the electronic mail of other people involved in the site. The links should always be active, adequate and enriching. |
| Updating | Changing and updating the information, content and links of the Web site continuously. Of course, disposing of all non-active links and old information. |

In the following section, we have collected all the criteria and sub-criteria mentioned above in a clearly explained rubric to evaluate a Web-based learning environment. In addition we gave an explanation for the process of calculating a score that characterizes the level and quality of the site.

**A Rubric for Evaluating Web-based learning environments** (Usability criterion)

|  |  |  |  |
| --- | --- | --- | --- |
| **Usability** (30) | Excellent (4-5) | Average (2-3) | Poor (0-1) |
| Purpose | The purpose of the Web site is presented clearly. | The purpose of the Web site is mentioned but unclearly. | The purpose of the Web site is not presented. |
| Homepage | The homepage includes a well-labeled clearly defined table of content. | The homepage includes a table of content but it is unorganized. | There is no table of content in the homepage. |
| Navigation | Moving around between the pages is clear and easy. In each page the users know where they are and where they can go next. | In some pages, the users feel lost and do not know where to go next. | Moving around between the pages of the Web site is confusing. |
| Design | The web pages are neat, simple and not overstuffed. There is harmony in the use of colors, fonts and backgrounds. | Some improvements could be done to make the web pages look better. | There is no harmony in the use of colors, fonts and backgrounds. |
| Enjoyment | Several attractive multimedia and humor features are used. These features are relevant to the subject and not too heavy. | There are few uses of multimedia and humor features, or the use of them is not appropriate. | There is no use of multimedia and humor features, and the Web site looks boring. |
| Readability | The content is presented clearly by proper use of text, sounds and images. | The content is presented by text, sounds and images, but poorly. | The content is presented by the use of text only, and it is also difficult to read it. |

**A Rubric for Evaluating Web-based learning environments** (Content criterion)

|  |  |  |  |
| --- | --- | --- | --- |
| **Content** (25) | Excellent (4-5) | Average (2-3) | Poor (0-1) |
| Authority | The information is based on well known and trusted resources. | The information is based on individuals or unknown resources. | The information is not based on resources. |
| Accuracy | The information is accurate and based on factual knowledge or professional thinking. | Some units of information are not accurate. | Most of the information is based on personal knowledge and not accurate. |
| Relevance | The information focuses on the main topic of the Web site. | Some units of information are irrelevant and marginal. | Most of the information is irrelevant and does not focus on the main topic. |
| Sufficiency | The amount of information is sufficient and not excessive. | There is a need to decrease or increase the amount of information. | The user can not get to the main topic because of the excessive or insufficient use of information. |
| Appropriateness | The presentation of the information and its difficulty level are appropriate to the target users. | Some adaptations must be made to present the information in a more appropriate way to the target users. | The presentation of the information and its difficulty level are not appropriate to the target users. |

**A Rubric for Evaluating Web-based learning environments** (Educational Value criterion)

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| --- | --- | --- | --- |
| **Educational Value**  (35) | Excellent (4-5) | Average (2-3) | Poor (0-1) |
| Learning activities | The Web site provides learning activities that expose the users to new information and encourage them to construct new knowledge and educational substance. | The Web site provides learning activities, but these activities do not introduce new information or do not require the users to construct educational substance. | There are no learning activities in the Web site. |
| Activity plan | Each learning activity is accompanied with an activity plan that includes: topic, objectives, target users and learning process. | Each learning activity is accompanied with an activity plan, but the plan does not include all the appropriate components. | There are no activity plans for the learning activities in the Web site. |
| Resources | The learning activities include well prepared content presented in diverse ways, and they direct the users to varied additional resources in the web. | The learning activities include content presented in one way only, and they direct the users to limited additional resources in the web. | The learning activities include content presented in a poor way, and they do not direct the users to additional resources on the web. |
| Communication | Users can interact with their teachers, experts and peers through e-mail, chat and forums. | The possibility to interact with others is limited and available through one communication tool only. | There is no way to interact with others. |
| Feedback | The coordinators of the Web site track the users' performance and evaluate their products continuously through mechanic or human feedback. | The coordinators of the Web site track the users' performance and evaluate their products frequently. | There is no tracking or evaluation of the users' performance. |
| Rubric | Each learning activity is accompanied with a clear and easy to use rubric for evaluating the users' performance. | Each learning activity is accompanied with a rubric, but the rubric is not clear and it is difficult to use it. | There are no rubrics provided to evaluate the users' performance. |
| Help tools | The Web site provides tools to assist users in solving technical, contextual and didactical problems that they might face. | The help tools provided in the Web site are limited and insufficient. | There are no help tools in the Web site. |

**A Rubric for Evaluating Web-based learning environments** (Vividness criterion)

|  |  |  |  |
| --- | --- | --- | --- |
| **Vividness** (10) | Excellent (4-5) | Average (2-3) | Poor (0-1) |
| Links | The Web site provides active and important links to other web pages and people involved in the Web site. | Some links are not active or not important to the users. | Most of the links are not active or not important to the users. |
| Updating | The Web site is being developed, changed and updated continuously. | The Web site is updated frequently. | The Web site was not updated for a long time. |

To complete the rubric we choose the appropriate level suitable to the Web-based learning environment in each sub criterion, and record the proper score in the chosen cell. Each sub criterion will have a score ranging between 0 and 5, so when adding the scores of the sub criteria we get a score for each criterion. Summing the scores of all the criteria we conclude the score of the Web site, which becomes a grade out of 100.

We can also add notes and recommendations in each sub criterion to suggest improvements to the coordinators and designers of the Web-based learning environment. Of course, if the teachers evaluate their own educational Web sites, they write comments for themselves that would help them to improve their sites. Also designers can use the rubric as an outline that guides them through the planning and construction process to remind them of the required components of a successful Web-based learning environment. Teachers as designers of educational Web sites can use the rubric to reflect on their work as they progress, in order to examine it and improve it.

It is important to note that the evaluation score of a Web-based learning environment gives only an indication of the completeness of it, but to get real benefit of the rubric we need to look deeper in each sub criterion to find the weaknesses and omissions. Two educational Web sites might have the same score, but the improvements needed on each of them might be totally different.

As technology evolves, new pedagogical tools and models will be introduced to the field of Web-based learning environments; therefore the criteria and sub criteria of the rubric should be dynamic and adjustable to fit these developments. The research in the field of evaluating educational Web sites in general should follow these new pedagogical models and define new criteria or redefine old ones to adjust and upgrade the evaluation tools.

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