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EVALUATING THE QUALITY OF STUDENT WEB DESIGN PROJECTS*

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This paper presents a collection of criteria for evaluating the quality of student web design projects. These criteria are suitable for development, self-evaluation, peer evaluation, and assessment of student-designed web sites. These rubrics were tested during a course in English for Information Technology administered to first-year students of Informatics at the Faculty of Mathematics and Informatics, Plovdiv University "Paisii Hilendarski". It helped students implementing a multidisciplinary web design project to acquire not only technical skills related to quality website design, but also some process skills they will need in real-practice settings.

1. Introduction. With the ever growing penetration of the Internet worldwide, the pattern of communication has been steadily changing in favor of the extensive use of the WWW. Hence, the need for web designers and web developers, who play a crucial role in the design, development, maintenance and support processes behind the involving experience of using the Net. Students graduating from Information Technology degrees are very likely to meet the requirements of prospective employers with web programming training as an important component of their educational background. While eager to master the latest techniques and tools, students more often tend to downplay the role of the sound principles behind efficient website design, possibly because of previous experience at school. "Modern development of computer equipment and information technology (IT) calls for new education and adequate training. This has led to the incorporation, since 2001/2002, of Information Technology as a compulsory subject in the 9th grades at the secondary school level in Bulgarian schools" [4]. As part of this training, secondary school students cover certain elements of web design and even implement some projects and assignments thereof. This is why they seem prone to assuming they have already learned the essentials without being tempted to enhance their knowledge and skills with fundamentals of graphic design, information design, interface design, etc. Such an assumption is shared by a number of first-year university students of IT and hence the need for some awareness raising, also meant to provoke their interest and, hopefully, motivation in their subject matter area. This will benefit even those who are not considering a career in web design because it will enable them to perform a lot better in applying the acquired skills for their own personal use.

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Inevitably, such a teaching and learning experience can be a mutually enriching one with teachers and students learning from each other. "Working with IT offers a great variety of situations which pose an intellectual challenge not only for the students, but also for the teachers. On the other hand, thanks to this feature, teachers can really learn something new in the course of the teaching process and thus show their students in real time that learning is a real life experience." [12]. The discussions during the sessions, for instance, provide ample opportunities for revising current practices and exploring new avenues for better efficiency of the teaching and learning process.

In addition to the purely technical insights, students can be offered an approach that allows them to acquire and practice some process skills. Such a need has been confirmed by a Eurobarometer survey which found that the "strongest support was given to ... programmes that included generic competences (to meet the demands of today's workplace): on average, 9 in 10 students agreed that study programmes should include communication skills, teamwork, and "learning to learn" techniques (90%)." [3].

This paper presents criteria suitable for development, self-evaluation, peer evaluation, and assessment of student-designed websites as part of a course in English for Information Technology. An account is given of a didactic experiment thereof as a component of a larger framework of project-based multidisciplinary efforts. Also included are sample screenshots illustrating the project outcomes.

2. Project-based learning in a nutshell. PjBL is an alternative method of teaching and learning which is employed in an effort to make schooling a less school-like experience and span a bridge to real-life contexts similar to those students are likely to work in upon graduation. Teaching professionals who support this avenue of educational reform believe it contributes to helping learners develop skills in the domains of self-directed learning, problem-solving, critical thinking, ability to work on a team, to name a few. However, there is no single unanimously accepted definition of PjBL and we have adopted the one proposed by the Buck Institute For Education, viz. "BIE defines standards-focused PBL as a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks"[6]. According to this definition, any partial implementations or instances of incorporating project-learning based activities are not referred to as PjBL proper. Nor is any assignment in its own right a project within PjBL to that matter. According to [13], PjBL projects "are central, not peripheral to the curriculum", " are focused on questions or problems that "drive" students to encounter (and struggle with) the central concepts and principles of a discipline.", "involve students in a constructive investigation.", "are student-driven to some significant degree.", "Projects are realistic, not school-like." In a nutshell, "the five criteria are centrality, driving question, constructive investigations, autonomy, and realism. "[ibid.]. A carefully selected list of PjBL benefits, e.g. motivation boost, autonomy enhancement, etc. and features, e.g. error and change tolerated, enhanced social and communication skills, etc. can be found in [7]. It is only natural that such an approach calls for teaching professionals who have undergone relevant training in this field. "The teachers' level of qualification and their motivation to implement quality training is one of the factors that determine the successful outcome of the process of modernization of education..." [1].

3. Criteria for evaluating the quality of student web design projects. When asked about how he could write such beautiful music, Mozart answered that he simply put together notes that love each other: as simple as that. This principle, however, can be transferred to almost any field of human activity, including web design. "Indeed, the elements and functionality of a finished website design should work as a single cohesive unit, so that: Users are pleased by the design but drawn to the content ...; Users can move about easily *via* intuitive navigation ...; Users recognize each page as belonging to the site" [2]. Easier said than done. To that end, website design incorporates a number of disciplines, e.g. Graphic design, Information design, Interface design, HTML, style sheet, and graphic production, Scripting and programming, Multimedia" [10].

Evaluation of educational Internet resources has a long history. A large number of evaluation rubrics have been developed and applied in the form of evaluation forms, checklists, etc., mainly to suit learners as users of web content. Nevertheless, they are very useful for designers, as well. Broadly speaking, they can be attributed to six main categories: Accuracy, Authority, Objectivity, Currency, Coverage (not necessarily overlapping with those in, e.g. [5]), and Technical issues.

After several years of experience, we have found that our students tend to benefit most from a set of criteria that we provide below with their generic descriptors.

1. **Punctuality** – The website content is error-free. There are no spelling, grammar, punctuation, factual, etc. mistakes. Using relevant tools is a must, and proofreading is essential.
2. **Reliability** – The website content is reliable. There is clear evidence of the credibility of the content on the website, e.g. Copyright statement identifying the ownership, a Disclaimer, perhaps even an explicit statement of endorsement.
3. **Audience** – The intended audience is identified either implicitly or explicitly or by a combination of both. This should apply to both the whole site and to its sections with meaningful relevant headings, etc.
4. **Goals and aims** – The goals and aims are stated either implicitly or explicitly or by a combination of both. The way of implementing this criterion largely depends on the target audience.
5. **Authors** – The author(s) of materials can be clearly identified. Thus the visitors will be able to distinguish the official standpoints from the personal views incorporated in the site.
6. **Contact/Feedback** – A contact person/address is available or there is at least a feedback facility. Visitors should be able to contact people in charge of the website and/or representatives of the owners or publishers.
7. **Responsibility** – Responsibility for the website content is indicated. This can be a Disclaimer statement, a Privacy and Legal Statement, or otherwise, as necessary.
8. **Currency** – The content is up-to-date. The site content should be regularly updated, as appropriate, and this should be communicated to the site visitors, e.g. News for November 1, 2009.
9. **Date details** – There is a clear distinction as to whether this is the date the site was first created/published/last revised. This information is usually located at the bottom of the page or in the Copyright section, etc. Some sites display the current date, usually at the top of the page, or even provide a calendar of the month, so the user should not be confused.

10. **Links currency** – The links to external sites are current. This is part of the effort to stay up to date, so that users frequent the site, as well as to make sure there are no dead links. There are online tools available, e.g. broken link checkers that can be quite helpful in the maintenance of a website.
11. **Bias** – Information is presented in an unbiased manner. It should be politically correct without potentially excluding content or design elements regarding gender, ethnicity, religion, politics, age, etc.
12. **Relevance** – The topics/features are relevant to the purpose and content of the website. Special caution should be exercised in cases of advertisements placed by third parties.
13. **Scope** – The topics are covered in adequate depth. In cases there are exceptions or special provisions, e.g. for international students, this should be clearly communicated.
14. **External links quality** – The quality of external web pages hyperlinked here is adequate. This relates to the credibility and reliability of the website.
15. **References and copyright** – There are appropriate references and copyright statements included as necessary. Young people seem to be eager to share online content, sometimes unintentionally overlooking certain established ethical norms related to copyright and neighbouring rights.
16. **Site structure and organization** – The site content is well organized. This calls for both logical grouping of ideas and balance in terms of the number of subheadings within a main heading.
17. **Information labels and organization** – The information is clearly labeled and organized. While the previous criterion refers to the organization on a site level, this pertains rather to web page level.
18. **Directions** – There are directions on how to use the site (or some of its features, if necessary), e.g. a Help section. Designers should accommodate for both expert and novice users, e.g. providing additional information concerning linking to this website, streaming content, file types and viewers, accessibility features, etc.
19. **Special features** – The site has some special features, e.g. Site search, Site map, Calendar, etc. included. Each of these features is meant to facilitate the user in finding information on the site faster, more conveniently, and not to be an end in itself demonstrating the web developer's proficiency in web technology.
20. **Added Value** – The site offers added value, e.g. EN-BG Glossary of IT terms, etc. This would contribute to the site visitors' sense of satisfaction with the experience related to this particular site. Even commercial websites offer materials that are not directly related to the sales of products or services.
21. **Interactivity** – The site provides interactivity. Most probably Web 2.0 technology will be too advanced for first-year students, but a chat facility, a forum or even a feedback form could contribute to this effort.
22. **Graphic design** – The site follows good graphic design principles and practices.
23. **Design and layout consistency** – There is consistency in terms of design and layout. Every page should be in harmony with the others.
24. **Navigation** – Navigation is easy (e.g. within 3 clicks away) and consistent throughout the website.

25. **Current location** – It easy for visitors to identify their current location on the website. Users should be able to identify where they are at any time of their visit, as well as the logical stepping stones from the Home page to this location.
26. **Load time** – The pages load fast. There are a number of online site optimization tools which student designers can use to analyze their work. For example, it should take the server less than 10 milliseconds to generate a page.
27. **Browser-friendly** – The site is equally effective with different browsers, e.g. IE, Firefox, Chrome, Safari, Opera, etc. Careful functionality tests should be carried out with the current versions of the most popular browsers and should be done on a regular basis during the maintenance process.
28. **Technical issues** – No technical problems are observed, e.g. failure to load pages, images, audio, video, or to access some features, etc.

It is crucial that these 28 criteria be negotiated rather than imposed on the students. They can be expanded or condensed to best suit the profile of the learners. For example, W3C validation or search engine optimization may be required of a more advanced group, while the browser friendliness criterion may be sacrificed in the case of a less proficient class.

4. The experiment. We conducted a didactic experiment with first-year students in the Bachelor's program in Informatics at the Faculty of Mathematics and Informatics (FMI), Plovdiv University "Paisii Hilendarski", during a course of 60 contact hours in English for Information Technology. More details on the implementation of this multi-disciplinary framework are provided in [11]. The timeline of activities is as follows:

1. Multimedia presentations, weeks 1–4
2. Portal website, weeks 5–7
3. IT job profile, week 8
4. Using online glossaries, week 8
5. Online test preparation, week 9
6. Final test and evaluation, week 10

The experiment featured a project in web design of a portal website "IT for First-Year Students at FMI, Plovdiv University" and was implemented in two stages.

As a first stage, the students prepared their projects on their own, based on prior experience and self-learning, without any limitations concerning the sources of acquiring the required knowledge and skills. Then, the students presented their websites before their peers and both examples of good practice and room for improvement were discussed in the form of self-evaluation and peer evaluation.

The second stage in the experiment started with the presentation of teacher-developed online materials meant to communicate the proposed set of 28 generic guidelines for development of efficient portal websites of the assigned type [8]. Then, the students prepared revised versions of their initial projects in compliance with the set of criteria. Having done that, they presented their work again before the same audience and a brief critique session followed each performance.

This two-step approach proved to be more efficient because it allowed students to reflect on their performance and fine-tune their goals to revise their work. Unlike similar activities in the previous years when students were asked to do their websites in just one try, this technique was felt to encourage students' inquiry by helping them gain insights while learning to learn from their past experience.

In teaching and learning efforts like this, the role of the teacher included that of a classroom project manager, counselor and facilitator, while the student was not just a "key speaker" on one website, i.e. their own, but also a peer evaluator and an active learner. Students acquired some learning how to learn skills, e.g. listening, observing, perceiving, note-taking, outlining, surveying, analyzing data, organizing data [9], etc. which they will be able to apply across the curriculum throughout their learning experience.

An invaluable helper during our experiment was a dedicated website. It was a very efficient communication channel with significant contribution to the course organization. Technology has more often than not made some teachers hesitant to resort to its ever changing facilities for a number of reasons which we are not going to explore here. We believe that using a CMS-based website, for example, is an accessible way for teachers with no advanced web skills to provide online support for their students in quite a straightforward way.

The critique sessions were welcomed both by the project authors and by the audience, as both parties could see a clear benefit from this while elaborating on their standpoints. Some of the teacher-elicited questions for the presenters were, e.g. What is the target audience for your website? What are the possible uses of this website? What makes this site unique? What is the technology behind this website? What improvements are needed to make this site better?, etc.

Of course, we encountered some performance and delivery challenges during the experiment. One major cause was related with students' attitude to delivery deadlines. Some of them were prone to postponing the implementation of their projects, which later on confronted them to the dilemma whether to sacrifice another project assigned to them on another course or to make concessions with regard to the quality of their performance

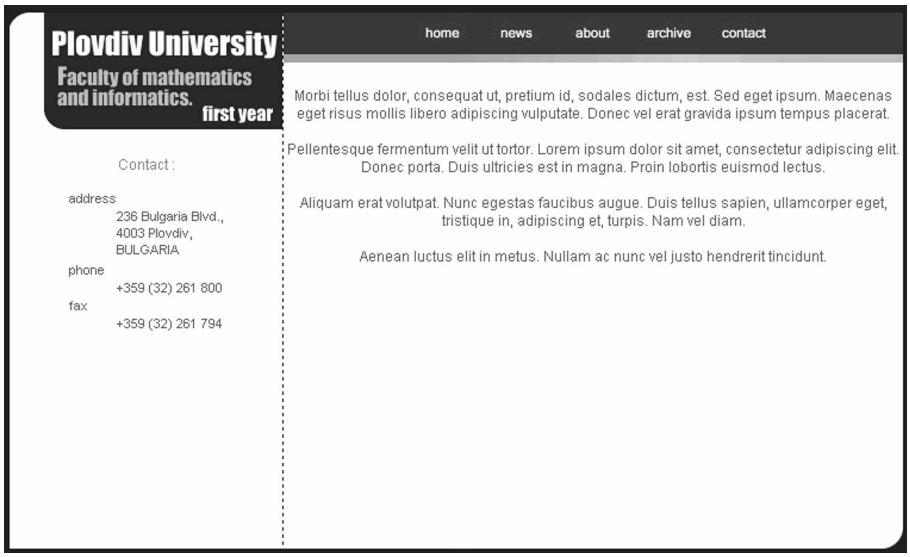

Fig. 1. First version of a home page

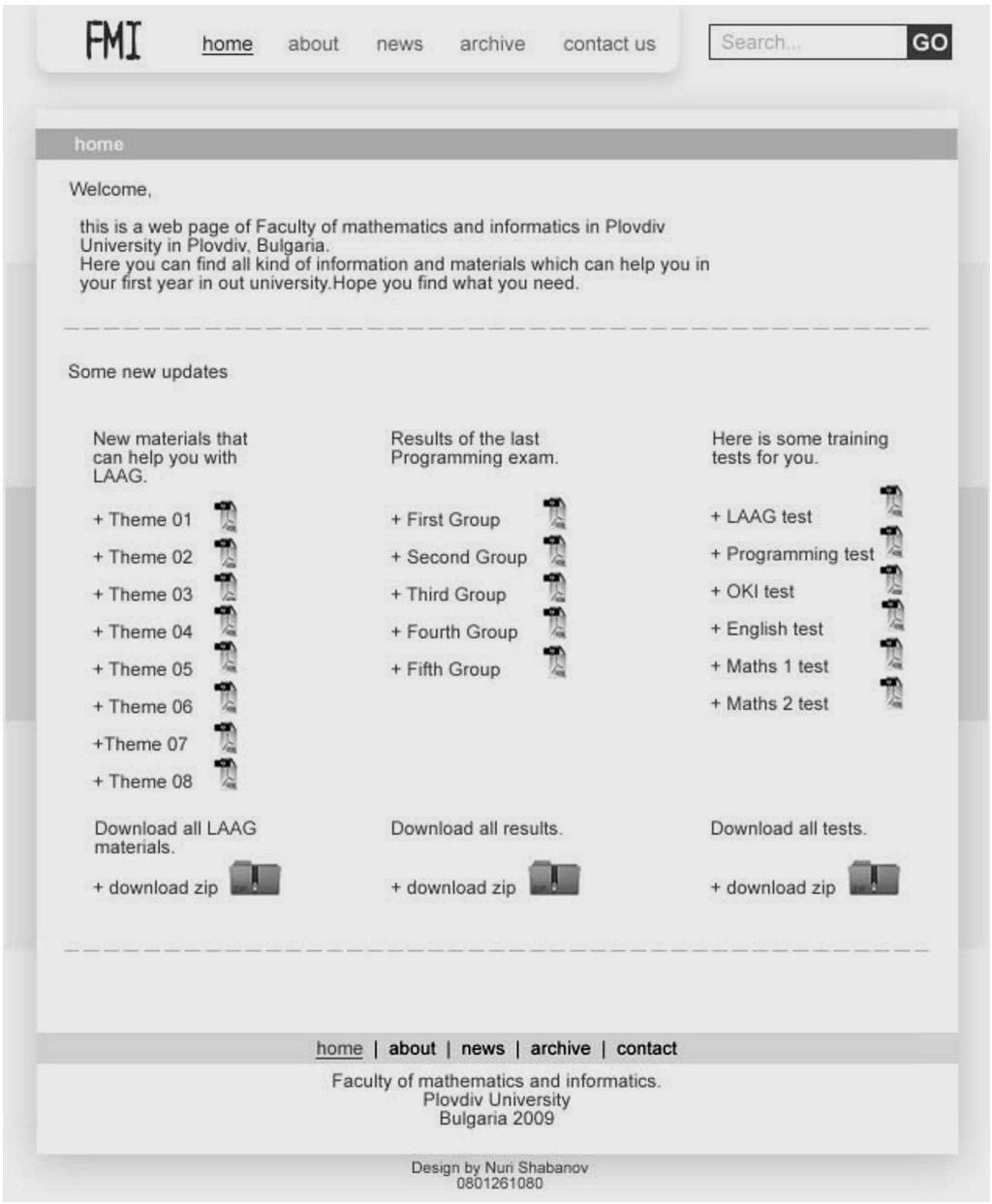

Fig. 2. The revised version of the home page

on this project due to time deficiency. Yet there were others who failed to deliver at all on some of the assignments. Another key reason for no or poor performance was the lack of previous experience in some of the learners. That seemed to pose a psychological barrier in that they did not dare to approach the unknown or were hesitant to take along a steep learning curve because of the due amount of time and effort required for success. In such cases of failure, however, we sought learning opportunities and raised students' awareness of time management, prioritizing, flexible thinking, dealing with change and other skills that matter in the real life. We were not passive observers of the mentioned processes of failure, but instead communicated with our students using e-mail and the dedicated website.

As this was a course in English for IT, the language used in the websites, as well as in the presentations and discussions, was English.

In a session dedicated to negotiating the website design quality evaluation criteria, the teacher made a presentation of the suggested list of criteria with authentic examples, as each item was accompanied by an illustration and discussed by the group. Websites of over 20 renowned educational institutions worldwide were examined, e.g. `http://www.kcl.ac.uk`, as evidence of the quality criteria was identified. The student designers found it very useful to step aside and look through the eyes of users.

After the self-evaluation and peer-evaluation session, they had a week to produce an improved version of their initial product.

Even when the revised version was far from perfect, we communicated to our students that what mattered most was the learning process and the progress made, rather than the final product itself. Once the students' awareness had been raised and they had focused on the relevant process skills, the beginning of the road to mastery was in sight.

Conclusion. Web development and design is a rapidly growing field of career opportunity for the graduates from the Informatics program at FMI, Plovdiv University "Paisii Hilendarski". We found that the flexible suite of criteria we had compiled raised the awareness of first-year students of Informatics of the core principles behind effective web design and provoked their inquiry during the course in English for Information Technology. Although the web design assignment featured an educational application, the sound principles of quality web design can be applied to many other fields, too. Within a project-based context, this framework also helped students acquire some process skills they will need in real-life settings.

The experience the authors gained will contribute to the design and a subsequent development of interactive online tools for evaluating the quality of student web design projects.

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ОЦЕНКА НА КАЧЕСТВОТО НА СТУДЕНТСКИ ПРОЕКТИ ЗА УЕБ ДИЗАЙН

Иван Шотлеков, Асен Рахнев

В настоящата работа се представя набор от критерии за оценяване на качеството на студентски проекти за уеб дизайн. Критериите са подходящи за разработване, самооценяване, колегиално оценяване и оценка на уеб сайтове, проектирани от студенти. Тази оценъчна скала е апробирана по време на курс "Английски език в информационните технологии", проведен със студенти от първи курс по информатика във Факултета по математика и информатика на Пловдивски университет "Паисий Хилендарски". Тя помага на студентите при разработването на мултидисциплинарен проект за уеб дизайн да придобият не само технически умения, свързани с проектирането на качествени уеб сайтове, но и някои процесуални умения, които ще им бъдат необходими в реалната практика.