PRACTISING WEB DESIGN ESSENTIALS BY ITERATIVE BLOG DEVELOPMENT WITHIN A COMMUNITY PORTAL

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Keywords: education supporting platform, community portal, blog-supported learning, learning communities, lifelong learning, teaching web design, teaching XSLT

Abstract: Following constructionism and the learning by doing approach of Papert in our university web design course students are given the task of building a personal blogs. Students thus practice selected Web technologies. The task is supported by a dedicated web-based integrated development environment. Their blogs are interconnected and communication is available. Students are also encouraged to publish relevant articles on their blogs. We have observed competitiveness boosting, experience exchange, and overall increase of involvement with the course. Our experience suggests improved quality of learning to the benefit of our students.

1 INTRODUCTION

Blogging, online communities formation and social networking have recently become important socio-economic phenomena that increasingly influence lives of all, no matter the age, background, or professional affiliation. Within the field of online publishing, the impact of blogging is especially influential. The blogosphere has proven to serve as an unforeseen media space easily accessible to everyone. Blogs have been used on an incredible variety of purposes, such as personal publication, independent journalism, online marketing and corporate public relations. The omnipresence of blogs and blog articles does in turn shape the habits of Internet users and it has impact on user's needs. Thus blogging has become unignorable in particular for web designers and web application developers. Therefore we advocate coverage of blogging by web design and web development curricula at any level. We will demonstrate later on that such inclusion may in fact contribute to the quality of such curricula increasing the fun factor and students' involvement with such courses.

The benefit of information technologies in learning has been justified (Papert and Caperton, 1999; Mosel, 2005) by such theoretical frameworks of knowledge and learning as radical constructivism and constructionism (Papert and Harel, 1991). These frameworks conjecture that knowledge is constructed from perception and interaction with the world. Moreover, perception, interpretation and representation of communication and knowledge are subjective among different learners. Constructionists suggest learning by doing – by personal experience and by practical exploration, by doing things in real world. Benefits of blogging and the newly emerging social Internet in education have been analyzed by Mosel (Mosel, 2005). According to Mosel, blogging contributes to effective construction and organization of knowledge. Through communication and discussion, that is easily triggered by the possibility of leaving a comment, one compares her subjective perceptions with the others and a socially shared view may evolve. Mosel views blogging and the associated social Internet technology as an emergent phenomenon and suggests its application in curricula and didactic applications as an open issue of particular interest.

In this paper we describe our university course on web design which makes use of blog development and blogging as practical assignments. In our course students learn web technologies through iterative development of their own blogs, directly experiencing the power of the technologies and experiment-

ing with them freely. This is in accordance with Papert's learning by doing approach. We encourage students to communicate with others, we focus on building a learning community, and thus facilitate learning of serious skills in a way which is appealing and entertaining.

In order to achieve all these goals we provide a web-based integrated development environment for our students which they use to build up their blogs. Blogs of all students are integrated into a portal, and accessible to all the other students. Communication and discussion is immediately available via comments under the blog articles, and so students get feedback and advise from their colleagues and from course lecturers as well. During our three year experience with this practical assignment and our platform we have observed on our students effects such as unpredicted creative realization, competitiveness boosting, mutual exchange of experience, etc. We conclude that thanks to our application students' interest and involvement with the course increases, students find working on the assignment amusing and quality of learning is increased. Our experience shows that choosing blogs and blogging for practical assignments was a particularly rewarding step and we agree with observations of Mosel (Mosel, 2005).

Full version of this paper is available online as technical report (Homola and Kubincová, 2009).

2 EDUCATIONAL BACKGROUND

Newest trends in the learning theories try to map and reflect the real impact of information and communication technology on the society. In this respect educational knowledge and learning theories such as constructivism and constructionism have become more and more significant. Constructivism, as an epistemology theory given by Piaget (Gruber and Voneche, 1995) refers to the process of knowledge construction from human experience. In radical constructivism of von Glasersfeld, the relation between the objective world and the individual's constructed representation of reality is characterized by the notion of *viability* (von Glasersfeld, 1995; Mosel, 2005). According to this theory, the important aspect of the subjective representations that individuals construct during the process of learning is the extent to which these are in conflict with the reality they face. These subjective representations are the more viable, the less the learner encounters conflicts when comparing them with new perceptions and acting upon them. Low viability of constructed knowledge purportedly leads to revision of constructed knowledge in the process of repetitive

exploration of reality from different angles and viewpoints. Radical constructivism results in the conclusion that human beings do not only actively construct perception and consciousness, but also knowledge and learning (Mosel, 2005). In accordance, constructivists regard humans to be inventively active subjects which create their knowledge from perception and interaction with the world.

Didactic approaches based on constructivism put stress on learning by discovering. Constructionism – a learning theory by Papert (Papert and Harel, 1991), states that the most effective way of learning is the learner's active knowledge construction. The use of these theories is promoted by the educational approach called *learning by doing*, in which learners obtain new knowledge from their own experience gained through the practical application of the subject matter.

Impact of new technologies on the learning process is an important research issue that has enjoyed attention (Papert and Caperton, 1999). A valuable insight on benefits of blogging and newly emerging technologies of the so called social Internet in education is offered by Mosel (Mosel, 2005). Mosel builds on notions of *microcontent*[1] and *micropublishing* as introduced by Spivack (Spivack, 2003). Loosely speaking, microcontent refers to URI-referable units of information accessible via Internet, each typically encapsulating no more then a small number of central ideas. Microconent typically occurs in collections of common themes and topics. The act of publishing microcontent is then called micropublishing by Spivack and Mosel. Undoubtedly, blogging is the most popular and most typical type of micropublishing. Blog postings are mostly rather short and consist of one or few topics. Hence they usually are more focused than longer elaborate articles which tend to have many interrelated arguments and are often highly complex.

According to Mosel, micropublishing and specifically blogging contributes to effective social construction and organization of knowledge of elevated quality with respect to the theory of radical constructivism. Blogs are often thematically focused and learner-centered. They represent also author's subjective views and statements as well as relations to other resources. The possibility of leaving a comment right under the blog article contributes to interaction and collaboration with other users. As small units of knowledge are much easier to discuss and deconstruct, they are also more helpful with respect to new knowledge construction. In addition, through collaboration, by identifying, formulating and discussing

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[1]Spivack's notion of microcontent (Spivack, 2003) is not to be confused with the notion of microcontent used in typography and usability (Nielsen, 1998).

problems and interests, a socially shared view can evolve. Mosel views blogging and associated social Internet technology as a rather unexplored emergent phenomenon and suggests its application in curricula and didactic applications as an open issue of particular interest.

3 OUR WEB DESIGN COURSE

The course "Modern Approaches in Web Design" is part of the Master-level curriculum in applied informatics at our university. The course provides a unifying view of the rich palette of web technologies currently used, that are to some extent covered within various other courses and concentrates in greater detail on selected technologies. The course has four main objectives. First, to give an overview of main technologies employed in web design and web development. Second, to cover selected technologies such as XML, XSLT[2] and CSS in great detail. Third, to make students acquainted with standards, methodologies and production issues that are relevant to industrial-level web development such as accessibility, usability, search engine optimizing, web application security, etc. Finally, to rise awareness of emerging phenomena that nowadays more than ever shape the Web and influence web design such as Web 2.0, blogs, community portals, social networking, etc.

Secondary although still very important goal of our course is to develop students' lifelong learning and personal development skills and competencies related to effective operation with professional knowledge that they acquire during their training but also during praxis. Such competencies include: ability to gather knowledge from various information sources, to analyze, synthesize, process and critically evaluate information, to effectively communicate one's professional stances and opinions, etc. We address these secondary goals by practical assignments that involve such activities (e.g., collecting information and publishing digest on-topic blog articles).

Students work on several practical assignments of which only one – the main project assignment – is mandatory, the rest are extra assignments which are awarded by extra evaluation points. For the main project assignment each student needs to implement a personal blog, especially the visual layout. The most notable extra assignment is the task of publishing blog articles on any topic that is related to the course. With this assignment students are encouraged to make their own research on Web technology, methodologies, tools, etc., a skill that they will frequently employ in their future praxis. Another interesting extra assignment is to implement original and unusual features on their blogs.

In the course learning contract students agree with their name and evaluation being exposed their colleagues which as we believe boosts competitiveness (see Sect. 5). At the end of the semester projects are evaluated. Half of the score for the project is for submitting a feature-rich blog, the other half is for meeting the web design quality standards such as code validity, accessibility and usability. The extra assignments add up some score and possibly improve student's grading. The extra score is not at all limited, and students may publish as many blog articles as they wish. However, they need to do some research or to spend extra working hours on their project and experiment with original features, and hence this assignment is practically limited only by the amount of working time they are willing to invest.

The nature of our course, its content and aims have inspired us in development of a supporting application that provides blog space for our students and it also serves as integrated development environment with help of which students are able to implement the visual layout of their blogs while sharing the same back-end. The main goals for the application are the following: to provide each student with a unified basic development environment for her blog, where especially all the blogs share the same back-end, and students can fully concentrate on the task of developing the visual layout for their blogs; to enable to use the very same blog space for submission of the blog articles for the extra assignments; to have such a blog portal back-end for this purpose, that would enable and boost students' communication; to support the teachers in the evaluation process.

4 OUR BLOG PORTAL

Our platform is part of the blog.matfyz.sk community portal. This portal is accessible to general public and is purported to become a dedicated unofficial community portal for the students but as well for the staff of our faculty. It serves to three main goals:

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[2]XSLT, the XML Style sheet Transformation language, is a recursive declarative template language that specifies how one XML format is translated into another one. Thanks to its nature, programming in XSLT is significantly different from common imperative languages such as C++ of Java. As XML has become widely adopted, XSLT programming is an important skill to train for computer science and applied informatics students.

Figure 1: Typical blog within our portal in default layout.

Figure 2: Article editing within the student's interface.

Community goal. To create an alternative and unofficial communication channel for the people connected to the faculty.

Educational goal. To provide a supportive environment for various courses taught at the faculty, most notably our course.

Research goal. The portal has been mostly developed by Bachelor and Master students as part of their Bachelor/Master projects. Design of the portal focuses on various research issues related to community building, internet publishing and social networking, various Web related technologies and real-world deployment of native XML databases.

Once a student has registered to the portal, the portal interfaces change for her and also the way her blog is processed is changed, and – from the student's point of view – the portal effectively turns into an integrated blog development environment. The portal makes heavy use of XML technologies. All data is stored in native XML database, the XML Query Language (XQL) is used for querying, and XSLT is then used to transform the XML data into browser readable XHTML documents. This fact has enabled us to develop with little effort special interfaces for students of the course, which are different from the interfaces used by ordinary users, and are heavily XML-oriented. Students post their articles using a designated data-driven XML format. Students' blogs are processed differently by the portal. At the beginning no layout is applied on their blogs and the students must develop the visual layout of their blogs by themselves, in XSLT and CSS. As their blogs are being developed, students are encouraged to post course related information on their blogs. Thus the portal supports two of the practical assignments of the course: development of visual layout of one's personal blog, and also publishing on topic articles on one's blog.
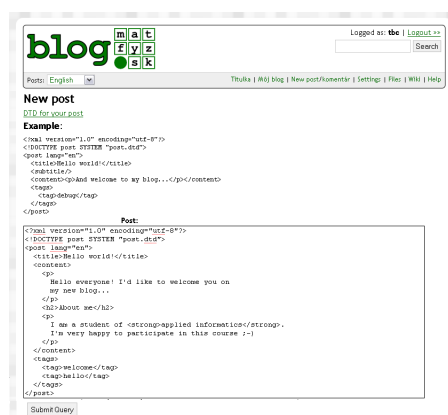
And, thanks to the design of interfaces, students practise XML, XSLT and CSS on the way.

As the portal serves for variety of goals, there are also trade-offs that had to be undertaken. For most of the semester, most of the students' blogs are underdeveloped, some even broken for certain periods of time. However, for the community building purpose, students' articles are visible to all portal visitors, including random internet users. When such a visitor encounters an article written by one of our students, the article is formatted using the standard portal layout. Students' own layouts are only visible to other students of the course. Each visitor, whether a class mate or not, is able to post comments on student's article. Thus students collect feedback from their colleagues, but possibly also from wider public.

We will now describe how students use the portal within the course and what they learn by using it. In order to demonstrate the functionality and features of her blog, the student is required to publish at least several articles throughout the semester. In addition students are encouraged to publish on topic on their blogs as they are rewarded extra evaluation points for that. By editing articles via the XML-oriented interface provided for them, they train all the basic XML notions and skills such as well-formed XML syntax, DTDs, validation, element and attribute types, etc. Another thing students extensively practise is programming in XSLT, as the portal only allows this language to be used in order to process the data and create the layout of one's blog. This is a useful skill since XSLT is nowadays more and more frequently applied in various contexts as XML data formats have become widely adopted. XSLT itself uses XML syntax, hence students contact time with XML is further increased.

To complete the project assignment students must implement a blog layout that includes basic and com-
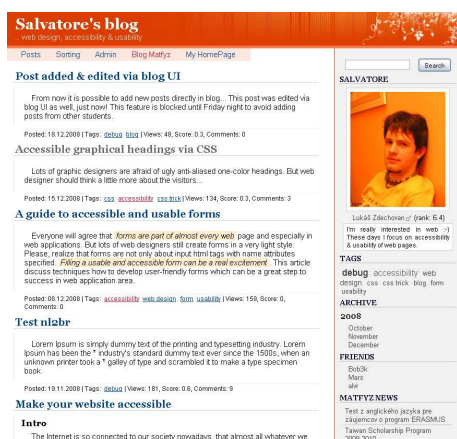
Figure 3: Custom blog layout by a student of the course.

Figure 4: Another student's custom blog layout.

monly expected blog features. Students are also encouraged to go beyond this basic requirements and to implement advanced features such as interactively folding tree views of comments, their own article management, access statistics, polls, etc. They are awarded some extra evaluation points for doing that. Every year some of the most active and creative students come up with entirely original ideas to implement on their blogs thus exploring blogs as a web design genre and publication media to the fullest. Another part of the blog which is evaluated is its compliance to the web design quality standards such as code validity, cross browser compatibility, accessibility and usability. It is not trivial at all to produce web applications that are both compliant with the quality standards and still neatly and attractively designed. What is more, this fact is still frequently ignored even by professional web developers; appealing design and cool user interface features are commonly preferred to accessibility and ease of use (Nielsen, 2008).

In this way students train XML, XSLT and CSS, they are acquainted with blogs and blogging as an important internet and social phenomenon that increasingly influences web design as a field, they master essentials of blog anatomy, community portal features, web page layout standards, and they are acquainted with web design quality standards as well.

5 EVALUATION

The course has already run three times in the form described in this paper. In Table 1 we provide some statistical data from each run of the course. Even if each student could get around by posting 3–4 articles, we can see that the average number of articles is higher

than that. Also, the number of comments significantly outnumbers the number of articles, and we notice unusually high number of comments for the second year even if the number of participating students was low on that year. Indeed students' activity varies for each group but overall we conclude that students' involvement with these assignments has been significantly high, and they share interest in communication with others. In addition to measurable values we have observed several things related to the didactic goals of the course, as follows.

Table 1: Students' activity per one run of the course.

Year	Students	Articles	Comments
2006/2007	190	1183	1555
2007/2008	87	649	1406
2008/2009	101	663	1172

Competitiveness. We really care for boosting competitiveness. We believe that it makes participation in the course attractive and possibly even entertaining. It increases students' involvement and results into deeper understanding of the subject matter. In order to achieve this, we enforce by the learning agreement that students' name and intermediate evaluation is accessible to all the other students. Student's blog and her work in progress is also visible to them. While such a move may rise privacy concerns, we believe that our decision is justified by increased quality of learning.

Communication. The portal provides means to comment on each blog article to everyone (even to general public). Thus students are easily able to communicate with their colleagues. As they all cope with similar tasks, they can provide valuable feedback one

to another. We also encourage students to document their progress by blog articles. This way they are immediately helpful to others and they can start discussion on the problems they encounter while coping with more difficult parts of the assignment.

Creativity. The task of developing one's own blog layout is a great opportunity to exercise creativity. The fact that everyone can easily see the work and progress of others, further boosts one's will to create something beautiful and original (at least in some students). Thus a programming exercise which might have otherwise been boring turns out to actually be fun for many students.

6   CONCLUSIONS

In our university web design and web application development course we rely on the theory of learning by doing that builds upon constructionism of Papert (Papert and Harel, 1991). Students work on various assignments, so that they practically explore what they are taught during the lectures. The main assignment amounts to developing a personal blog. We have created a web-based platform that provides an integrated blog development environment to our students. The platform is part of a wider community portal used at our faculty. Students' interfaces are heavy XML-oriented, they develop their blogs by applying XSLT and CSS on XML data, thus effectively practising these technologies.

Students' blogs are not isolated, but they are instead interconnected within the portal. Communication means such as the possibility to comment on each and every article are readily available. This supports students' mutual interaction and contributes to their collaboration during the learning process. Thus a learning community is effectively formed. The participants of such a learning community are able to compare their work with their peers including the intermediate evaluation. This creates competition, improves students involvement with the course and increases their understanding and interest in the subject matter. We have observed situations in which individual students appeared to be dragged into the work on their projects by their peers or simply as they realized that others are already ahead of them. In additional assignments we encourage our students to publish meaningful articles on their blogs, documenting their work in progress and blogging on topics related to the course subject as well. Thus according to Mosel (Mosel, 2005) efficient subjective learning is stimulated and social knowledge construction is enabled. In addition these tasks require collecting and process-

ing relevant information and communicating this information together with personal views and opinions. Hence the students' development continues in such areas as gaining lifelong learning habits, information gathering, analyzing, synthesizing and communication of one's professional opinions and stances. We conclude that use of blogging environments, for instance in the way that we have described in this paper and that we employ in our course, is particularly suitable to support such educational goals.

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