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ABSTRACT

This paper describes how Open Source philosophy, a movement that has developed in opposition to the proprietary software industry, has influenced educational practice in the pursuit of scholarly freedom and authentic learning activities for students and educators. This paper provides a brief overview of the Open Source movement, and describes three Open Source-inspired Web-based tools/environments developed to promote open sharing and constructing of scholarly work on the Web: self-publishing, knowledge sharing and peer-to-peer networking. Includes three color figures. (Author/AEF)

Xtreme Learning Control: Examples of the Open Source Movement's Impact on Our Educational Practice in a University Setting

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Abstract: This paper describes how Open Source philosophy – a movement that has developed in opposition to the proprietary software industry – has influenced our educational practice in the pursuit of scholarly freedom and authentic learning activities for our students and ourselves. This paper provides a brief overview of the Open Source movement, and describes three Open Source-inspired Web-based tools/environments developed to promote open sharing and constructing of scholarly work on the Web.

Overview

Do you know the story about the discovery of the structure of DNA? Or, the discovery of the Rosetta Stone cipher? Both are stories of not only brilliance, but also competition. Relying on the foundational work of Linus Pauling, Francis Crick and James Watson discovered the double helix. Then separately, relying on the foundational work of Thomas Young, Jean Francois Champollion deciphered the Stone's script. However, due to competition and secrecy, which kept all parties from openly sharing their findings (and possibly sharing the rewards of discovery...after all, whose name do you remember?), the progress of science may have been delayed. This type of competition is in direct conflict with the nature of science and discovery – a process of evolving exploration founded on the work of others.

Educators are concerned with the impact this type of competition and secrecy can have on their practice as well; educational innovation can be stymied by industry and individuals that perpetuate the politics and control over professional sharing and advancement – such as the publishing industry or the proprietary communication and collaboration software industry. Although some educators may hold secret the work they are doing to advance knowledge and practice around good teaching and learning, most are interested in advancing the collective understanding – in sharing insights, ideas, solutions, and materials that can help us all do our work more effectively. Educators are also interested in creating tools and structures that support the type of learner-centered, collaborative knowledge sharing that can lead to discovery and innovation. Often, educators are stymied in these pursuits due to excessive proprietary software costs and dwindling institutional budgets.

This paper describes how Open Source philosophy – a movement that has developed in opposition to the proprietary software industry – has influenced our educational practice in the pursuit of scholarly freedom and authentic learning activities for our students and ourselves. This paper provides a brief overview of the Open Source movement, and describes three Open Source-inspired Web-based tools/environments we have developed with our students and colleagues to promote open sharing and constructing of scholarly work on the Web.

Open Source Movement

Encouraging innovation through open sharing to facilitate replication and discovery, the Open Source movement is a grassroots revolution that has taken shape in the world of information technology. The Open Source movement is challenging the commercial model of technology advancement, exemplified in the software industry by Microsoft. Linux, an operating system whose source code is open for the world to see and costs nothing to download and use, has become a significant force for change in the software development world. Other information technology products emerging from the movement include Netscape/Mozilla, Apache, Perl, and GIMP. Open Source advocates are trying to create a world where software is openly

available and a living is made through continuing relationships of service and support. These same Open Source ideas are influencing our teaching and learning practice. The following are three examples of how Open Source has impacted our work with students at the University of Colorado at Denver.

Self-Publishing: *NOVAtions Online Journal [in Joni's voice]*

A year ago, I was informed that it was my turn to teach a doctoral course focused on instructional technology during the up-coming fall semester. This course is part of a doctoral program in educational leadership and innovation, and – as such – the participating doctoral students were interested in a wide range of educational foci: teacher education, paraprofessional preparation, teaching and learning in K-12 and adult settings, and technology-enhanced learning. In preparing for the course I anticipated insightful, yet challenging, discussions and collaborations given the diverse backgrounds and interests of the students. I realized that there was no way for me to be the "expert" in all of their interest areas during our experience together, and that I didn't need to be because the students were emerging experts in the topic foci they were studying. So, I looked for a way to create a unifying theme and project while at the same time taking advantage of the developing expertise of the students to create a valuable learning experience for everyone – including myself. To this end, we built a grassroots online professional journal.

NOVAtions is an online journal for emerging scholars built using the Slashdot.org Open Source code (see http://novations.opencentric.com). Slashdot.org is an online self-organizing social system (OSOSS) (Wiley & Edwards, 2002) that is a Web-based news source in which the readership contributes and reviews news items, and has significant influence and control over the direction of and themes covered by the site. Our *NOVAtions* journal is designed to provide a forum for a community of practice – scholars interested in educational innovation in teaching and learning. Contributors to the journal also function as the editorial review board, in much the same was as Amazon and Barnes and Noble enable the book buying public to serve as reviewers.

The doctoral students in my course built the *NOVAtions* journal from scratch (see Figure 1). Self-publishing the online journal provides the doctoral students with an authentic, enculturating leadership experience in which they:

- publish articles and collaborative book reviews to learn more about the process of sharing scholarly ideas with others and publishing ideas in a journal, and
- serve as the editorial review board to learn about the editing process and improve their own writing.

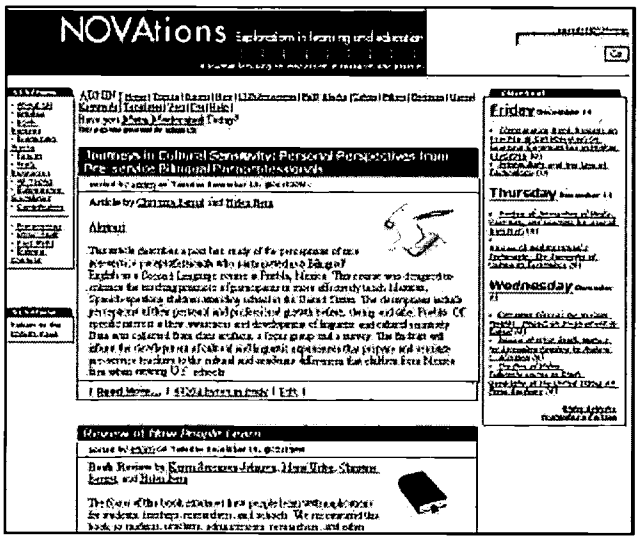

Figure 1: Students self-publishing in *NOVAtions* online journal

This fledgling journal was launched in December 2001, and plans are now in the works to extend the journal participation to the larger community of practice in educational leadership and innovation.

Knowledge Sharing: *Web Resource Collaboration Center (WRCC) [in Joni's voice]*

The Web Resource Collaboration Center (WRCC) (Dunlap, 1999) is a Web-based tool which empowers learners to build their own Web-based resource centers – using the Web to provide on-demand access to integrated information, guidance, advice, assistance, training, and tools – to support their learning, professional development, and performance.

A few years ago, I was hired by an information technology organization to "get to the bottom" of why its elaborate electronic performance support system (EPSS) which was available on the company's intranet was not being utilized by employees. The company had used its training and development resources to build this EPSS to help employees keep up with all of the new technologies they were expected to master for the various contractual projects of the organization. Since a front-end analysis was not actually conducted before the development of the EPSS, this is where I started. The employees were pleased that the EPSS provided a variety of resources (e.g., tutorials, white papers, job aids, business cases, etc.) to support their various learning needs and preferences. Instead of conventional training, they wanted access to learning and professional development resources that would help them keep their knowledge and skills "cutting edge".

Although they were not against the idea of an EPSS, the employees did not believe that the developers of the EPSS understood what resources they needed. In addition, they certainly believed that developers did not know how to present them in contextualized ways (e.g., resources that would help with one type of project vs. another type of project). They were also concerned that there was no way to capture the "here's how I did it" expertise of the people in the organization, and in the external community of practice. Finally, the EPSS was static. This was in sharp contrast to the constantly evolving information and tools these employees were using. The most up-to-date information was being distributed on the Web. The EPSS was not dynamic enough to capture those changes, so the employees were using the Web to support their learning and professional development – albeit not very efficiently which led to frustration. Bottom line, the employees had been cut out of the process, and believed that they were better judges of what was needed to support their learning and work.

This consultation led to my interest in developing a tool that would (1) take advantage of some of the structural qualities of EPSS, (2) harness the resources on the Web (since it was a distribution source for some of the most up-to-date information and tools), and (3) provide a structure for learning communities and communities of practice to build their own unique content to support both lifelong learning and professional development activities. To meet this challenge, we created a Web-based development tool called the Web Resource Collaboration Center (WRCC).

By creating a structure that supports individualized and collaborative knowledge building by the people who will actually be using the knowledge, the higher-order thinking, problem-solving, and decision-making involved in the selection and utilization of appropriate learning materials and performance support is done by those who can get the most out of the process. Additionally, because these activities occur in the workplace and are driven by the needs of the job at hand, the learning activities are contextualized, authentic, and meaningful. The WRCC meets the following goals:

- The users learn about the domain while they are locating, evaluating (which requires utilization of resources), organizing, and creating resources to support their learning and job performance activities – making the process relevant and productive;
- The content of the WRCC is information that has been applied/articulated from the perspective of reflective practice, making the WRCC a knowledge management forum;
- The WRCC is developed by and for the people involved in the project, challenge, or domain; and
- The WRCC can change and adapt based on the changing organizational and learning/performance needs because the end-users control the content.

In this way, the WRCC not only enables learners to build a learning and performance resource that will provide them with immediate support and guidance, but also helps them develop structure, strategies, and skills for subsequent learning activities.

To provide a structure for these activities, the WRCC is broken into three functional areas: the Discussion Forum, the Link Manager, and the Resource Construction System (see Figure 2). These tools – written entirely in Perl – are not unique – there are similar tools available from a variety of sources. The impact is in the use and integration of the tools, and the fact that they are Open Source and support learner-centered knowledge sharing.

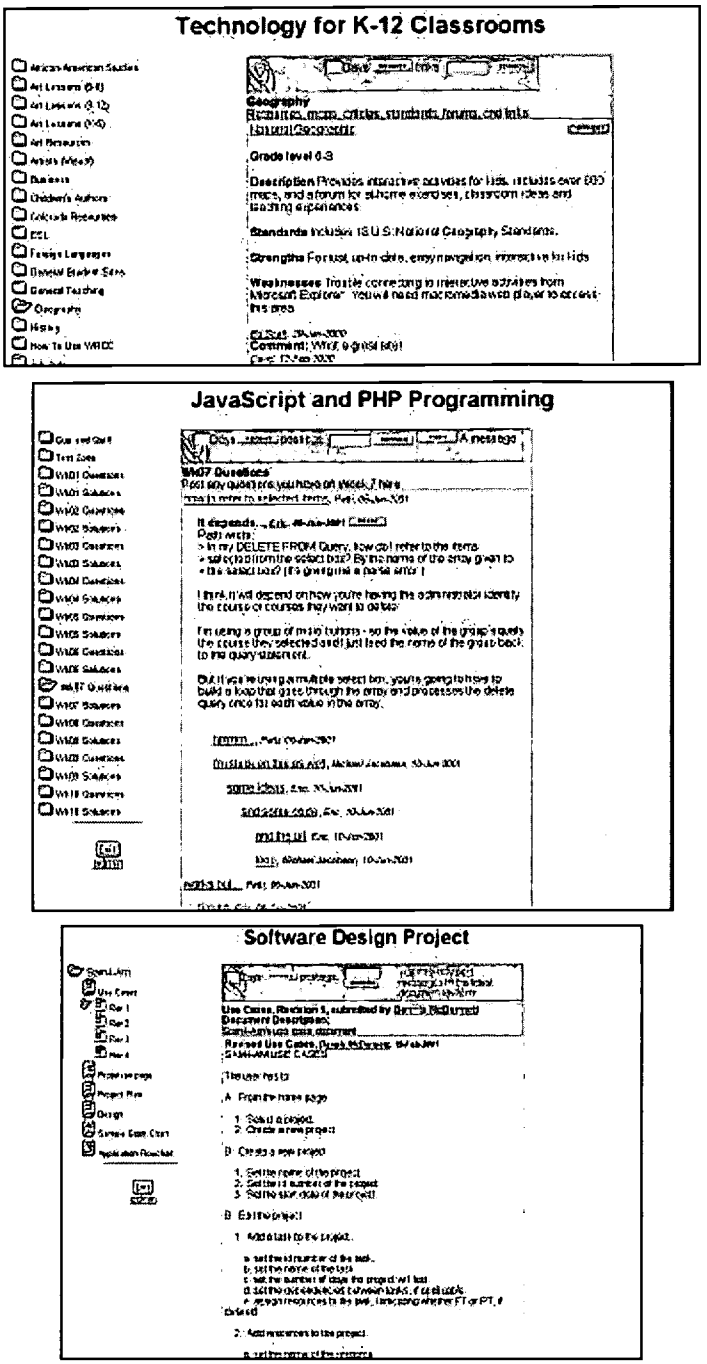

Figure 2: Examples of WRCC's Link Manager, Discussion Forum, and Resource Construction System

Once built, I recognized the value of this type of tool for learning communities in general, including the students I work with at the university. The WRCC is being used to support instructional activity in both face-to-face and online courses, and as a performance support and knowledge management tool by self-organizing learning communities (see http://carbon.cudenver.edu/public/wle/wrcc/techfork12/ for an example of a WRCC).

Self-Organized Learning and Performance Support Groups: *Electronic Knowledge Base (EKB)*

In our Information and Learning Technologies (ILT) Master's program, we organize students into cohorts. As a cohort, students progress through the program together, and quickly develop of professional bond that lasts beyond the program. One ILT Master's cohort of 20 K-12 teachers shared a common purpose of learning how to best integrate technology into their instruction, classrooms and schools. This group was constantly sharing their views, understandings, and opinions, as well as information and research they unearthed. This collective base of knowledge was the lifeblood of their common endeavor, and they wanted to "capture" the knowledge they were discovering and constructing with each other.

Inspired by Jonassen, Peck, and Wilson's (1997) note that "learning and knowledge-building communities depend heavily on ... a rich collection of information and learning resources to support them," this cohort designed and developed Electronic Knowledge Bases (EKBs) using adapted Perl scripts available at no charge to educational institutions (Young, 2000; see http://carbon.cudenver.edu/public/ilt/pages/). They used the EKBs as a way to formalize the process of collecting a rich source of knowledge resources. These databases served as an easily accessible and amendable repository of knowledge assisting them in their search for specific information and research related to teaching and learning. The EKBs supported their efforts as a dynamic learning community, and became a source of knowledge for other educators not participating in the ILT Master's program (see Figure 3). Dave Young, then a student and more recently a faculty colleague and co-author, was the primary developer of the resource.

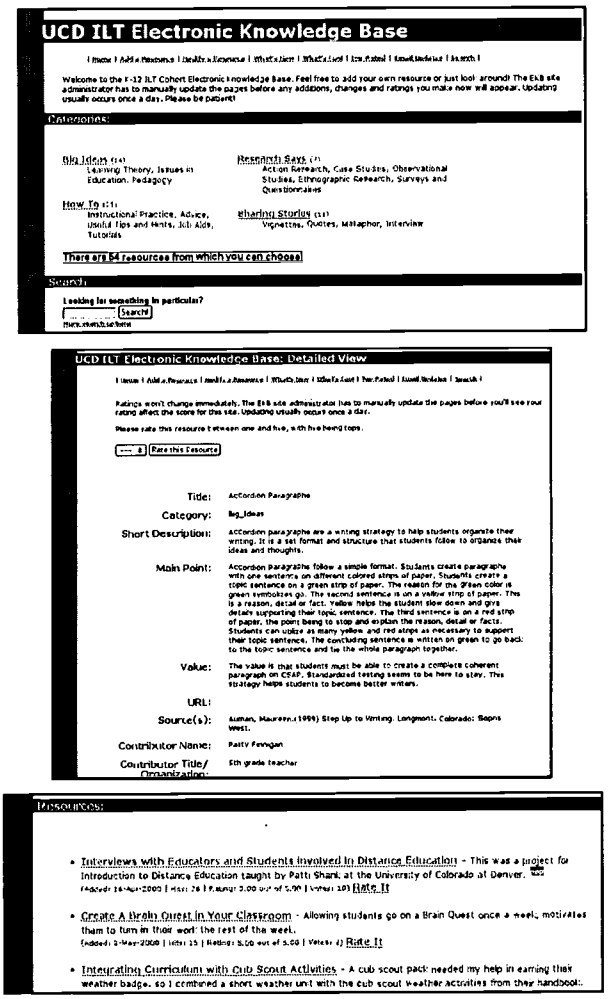

Figure 3: EKB Homepage, Detailed View of Contribution, and Resource Review Feature

Peer-to-peer networking: *Our Next Adventure*

Although we haven't implemented peer-to-peer networking in our environment, we are very intrigued by the possibilities and planning it as a next step in our adventure in reclaiming learner control. Peer-to-peer networking refers to individual users sharing resources by opening up their hard drives to each other – a group of computers communicate directly with each other, rather than through a central server. Besides potentially having a positive impact on collaboration and knowledge sharing, it can also make good technical, infrastructure sense – if computing power and resources are distributed then no one server or network connection is over-taxed.

The Napster phenomenon taught us that downloading from central servers is not the only way to perpetuate an online enterprise. The core concept is even more radical than Napster's, because once out of the bag and in the hands of end users, true peer-to-peer usage cannot be controlled. In this way peer-to-peer networking constitutes a classic form of self-organizing system, using the technology to bypass every form of central control and put the control in the hands of learners.

Conclusion

The Open Source movement is a reenergizing catalyst for our reclamation of *learner control*. Influencing how we think about supporting collaboration, knowledge sharing, and teaching and learning in general, we are embracing the message of Open Source with open arms. The three examples described above – as well as the work being done by colleagues at other institutions, such as Utah State University's SlashLEARN project (Irving, 2001; see http://www.slashlearn.org/) and StorageTek's COSS project (Ryder & Wilson, 1997) – have inspired us to continue to enrich our practice and our students' learning experiences through the integration of Open Source-inspired tools and environments. We look forward to sharing our projects and implementation results with our ED-MEDIA colleagues.

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