Community, Content and Collaboration Management Systems in Education: A new chance for socio-constructivist scenarios?

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SUMMARY

While one can observe a boom of interest for e-learning in the last 2-3 years, current e-learning systems rather focus on content delivery, as opposed to supporting students to solve more complex and open-ended tasks. We are convinced by the effectiveness of socio-constructivist pedagogies in education and struck by the apparent lack of widely deployed supporting tools. We would like to argue that a large number of rich educational scenarios can be supported at reasonable cost by the emerging brand of modular Community, Content and Collaboration Management Systems (C3MS).

KEYWORDS: socio-constructivist learning, Internet, portals, community

INTRODUCTION & PROBLEM STATEMENT

Currently, there exist many variants of web-supported pedagogies, e.g. transmission of contents by teleconferencing or virtual libraries, web-based instruction, learning by apprenticeship in virtual environments, pedagogical work flow scenarios. The pedagogical use of Web technology started out in 1993 with early adopters using the web for innovative project-based "teaching and learning". On the other hand, web-based training systems inspired by traditional CBT software started appearing on the market and form the core of today's so-called "Learning Management" or "E-learning" systems (Landon's Website). While these systems anchored in the behaviorist tradition are making interesting progress as far as modularity of contents and standardization are concerned, they do not fundamentally seek to improve pedagogies by supporting rich socio-constructivist scenarios. As many observers have pointed out: « The emphasis of most e-learning programs to date has been on the accumulation, organization, and delivery of content. This is manifested in all aspects of how the new sector has been organized: in the business and operating models of the service and technology providers; in the design and organization of the content and learning management systems that are now widely used; and in the investments venture capitalists, publishers, universities, and corporations have made. » (Gilroy 2001).

We define "socio-constructivist learning" in a very broad sense. First of all as an understanding of learning that stresses the importance of knowledge construction based on previous knowledge and interaction with the social environment, e.g. theories that have grown out of constructionism (Piaget) and socio-culturalism (Vygotsky). Second as a set of pedagogies that use strategies like project, problem, case-based learning and/or working within authentic contexts. While there are important differences in thought and practise there are a few common denominators in socio-constructivist pedagogies. E.g. Wilson (2000) isolates three core principles for effective use of the Web for learning:

1. Provide access to rich sources of information.
2. Encourage meaningful interactions with content.
3 Bring people together to challenge, support, or respond to each other.

While (1) is being dealt with the Internet itself, (2) and (3) usually need orchestrations by a teacher. E.g. Dillenbourg, Baker, Blaye & O'Malley’s (1999) survey of empirical research reveals that collaborative learning is not per se an effective learning method. Greening (1998) makes a similar point for problem-based pedagogies. Effectiveness is not guaranteed if the teacher simply asks students to do projects and to learn together. The efforts to make it effective require the use of structured scenarios. A scenario is a sequence of phases within which group members have tasks to do and specific roles to play. While teachers can regulate and orchestrate complex scenarios with very little technology the effort can soon become cumbersome. In addition, more advanced functionalities like visualizations of student activities can simply not be done without the help of technology. In other words, we need educational software less to deliver course-ware (even interactive one) but rather to support students to solve more complex and open-ended tasks. While there are an interesting number of non-behaviorist research systems and while constructivist (e.g. project or problem-based) scenarios are quite popular (Wilson & Lowry, 2001), they are not supported by the same amount of technology as the scenarios inspired by more traditional instructional design (Reigeluth 1983) are. Our current work aims to provide affordable support for innovative scenarios described by various socio-constructivist schools of thought.

SOCIO-CONSTRUCTIVIST TEACHING & LEARNING

We would like to argue that socio-constructivist pedagogies need support at three levels: (1) the micro-level (more focused learning scenarios and/or small projects), (2) long term projects and (3) the general study environment.

Basic Internet-supported socio-constructivist scenarios

Central to socio-constructivist scenarios is the project. "The reason that Dewey, Papert, and others have advocated learning from projects rather than from isolated problems is, in part, so that students can face the task of formulating their own problems, guided on the one hand by the general goals they set, and on the other hand by the 'interesting' phenomena and difficulties they discover through their interaction with the environment" (Collins et al 1989: 487). A key aspect of this "apprenticeship" approach to teaching involves sequencing scenarios and also breaking the problem into parts so that students are challenged to master as much of a task as they are ready to handle. Frequently, scenarios evolve in cycles, e.g. a basic teaching/learning phase has the following structure:

1. Look (discovery)
2. Discuss (interaction)
3. Do (production)
4. Deposit (sharing)
5. Feedback (discussion of results)

In order to promote socio-constructivist scenarios we have established an initial catalog of simple socio-constructivist learning activities (Frété, Schneider, Synteta 2002) that we would like to share with the community. In more general terms we can argue that activities should start by a warming up in order to generate curiosity, interest, motivation and also lead the student to realize the point in using technology in this context. The activities should incorporate inductive discovery “boosters”: exploration, information research, experimentation, and hypothesis formulation. The student should be active and creative and be led to discuss and cooperate with his peers, interact and share his knowledge. The scenarios are classified according to the following categories:

1. Gathering and distribution of information: Teachers and students share resources and the activities are designed to help them gather information and make it available to all.
2. Creation of collaborative documents: Here the students can write definitions, analyze cases, solve problems, write documents and create illustrated documents together around specific themes.
3. Discussion and commentaries around productions: Students identify together facts, principles and concepts and clarify complex ideas. They formulate hypothesis and plan solutions, make links between ideas, compare different points of view, argue, evaluate...

Let’s have a look at an example of a scenario called “debate”.

Title	Debate
Goals	Argumentation, hypothesis formulation, conceptualization, comparison, critic, evaluation, curiosity, synthesis, language…
Public	12-13 years old students and more
Description	The students have to analyze a society problem and work out key issues
Duration	1 to 2 sessions

Steps:

1. The teacher initiates the debate giving some clues (**IntroWork**, **BrainStorm**)
2. He posts the question (**SubmitStory**)
3. The students think about the different issues and give a first advice in the shape of a commentary (**SumitComment**)

4. Each student reads what all the others have said and builds a short list synthesizing the different points of view. They post their production. (**SubmitComment**)
5. The teacher enters the name of the participants in the « polls » section (**EditVote**) and the students vote for the best list (**VoteFor**)
6. The most successful list is then displayed in the polls section so as to organize a larger scale poll. (**EditVote**)

Each scenario described in the catalogue is composed of a certain amount of **steps** that can be described in terms of **generic educational activities**, which we labeled with a tag. like “BrainStrom” or “SubmitComment”. Technical “C3MS bricks” (see below) can in their turn, support most of these labeled generic activities**.** A teacher can therefore plan educational scenarios with the help of a more abstract vocabulary that will help him to choose from a set of supporting technology.

Project-based Learning

In addition to the rather atomic learning scenarios mentioned above we also target complex long-term projects (e.g. the “size” of a term paper) and which are inspired by project-based learning schools of thought (Thomas 2000 and Synteta 2001).

Project Based Learning is a teaching and learning model (curriculum development and instructional approach) that shifts away from traditional teacher-centered teaching and emphasizes student-centered instruction by assigning projects. It allows students to work autonomously to construct their own learning, and culminates in realistic, student-generated products.

More specifically, project-based learning can be defined as (Synteta 2001:13) :

- Engaging learning experiences that involve students in complex, real-world **projects** through which they develop and apply skills and knowledge
- Learning that requires students to draw from many information sources and disciplines in order to solve problems
- Learning in which curricular outcomes can be identified up-front, but in which the outcomes of the student's learning process are neither predetermined nor fully predictable
- Experiences through which students learn to manage and allocate resources such as time and materials.

Projects are complex tasks involving many different complex activities like the scenarios described above. And therefore support for project may involve several scenarios, which are further decomposed in smaller phases. In particular students need scaffolding for (a) initiating inquiry, formulate coherent research questions; (b) define a research project; (c) direct investigations; find resources, (d) manage time; keep deadlines, estimate time needed to do a task, (e) collaborate and give feedback; articulate work of others and give regular feedback, (f) follow-up the project; revise products, (Synteta & Schneider 2002). For all these situations we can imagine that computational support and certain stages of the collective research project can be scenarized to profit from the relate-create-donate principle of engagement theory (Shneiderman 1988).

The community factor

As formulated by e-learning practitioner Gilroy (2001) "E-learning should be first and foremost about creating a social space that must be managed for the teaching and learning needs of the particular group of people inhabiting that space". Or from an other perspective: “In order for individuals to learn how to construct knowledge, it is necessary that the process be modeled and supported in the surrounding community. This is what occurs in a learning community” (Bielaczyc & Collins 1999: 272). While a large part of our knowledge comes indeed from formally planned learning scenarios, people learn a lot from informal exchange with fellow learners, with professors, experts, i.e. from exchange within tightly or loosely defined communities. We can define communities as networks, made up of individuals as well as public and private institutions. They share a certain amount of practices, common goals and common language. They do have a social organization including formal or informal hierarchies and some idea of "social service" (members helping each other). Beyond this abstract definition, "community" is quite an ambiguous concept that encompasses, for example, communities of practice (e.g. teachers from a same school or teaching similar things), local communities (people living in the same area) and virtual communities (people sharing some information over the internet). Communities can be constituted or at least greatly enhanced with the help of collaboration and information.

We also should point out that community portals are becoming popular in other contexts. Increasing familiarity with this tool and perception of its general usefulness for "real life" will help introducing it to education (like the successful use word processors for creative writing). Success stories of new technologies in education are often related to the teachers’ ability to insert it into existing knowledge. In other words, it is easier to promote change when teachers can relate to “models” they know, even if they are not necessarily related to teaching. Teachers able to understand the meaning of simple bricks might be more willing to use them for building more complex scenarios, i.e. teachers must have an operational awareness (vonGlasersfeld) in addition to operational control. In addition, there exist sporadic initiatives for building school or campus portals that are actually useful to the community and not just a presentation/information tool designed by some central service as window to the outside world. Such portals could add support to teaching activities by giving each teacher his own C3MS space.

COMMUNITY, COLLABORATION AND CONTENT MANAGEMENT SYSTEMS

Simple Internet technologies (web pages, forums, e-mail, FTP etc.) have been successful in education because they answered basic needs for information exchange, communication and collaboration needed for constructivist scenarios. In addition to being simple, yet powerful, Internet lets the user (teachers) have control. While simple web technology does enable creative scenarios it has 4 drawbacks: (1) Maintaining static web-sites (including the student's pages) is time-consuming, (2) simple discussion systems like forums or mailing-lists do not very good knowledge management. (3) More sophisticated scenarios (like co-authoring or work-flow) are badly supported and (4) there is no glue for putting all these together.

Community web-sites actually face quite similar problems and seem to have found at least a partial answer. Within the last two years an impressive number of what the authors coin C3MS (Community, Content and Collaboration Management Systems) have sprung into existence. Inspired by personal weblogs (also called blogs, which are increasingly popular journaling systems), slashdot-like weblog/news systems, simple content management systems and various popular groupware applications, they offer a modular system for configuring interactive community web-sites. In addition, most of these systems provide documented extension mechanisms allowing third party persons to contribute modules with additional functionalities. C3MS systems are a form of Web portals. A portal gathers a variety of useful information and communication resources into a single, ‘one-stop’ web page (Looney and Lyman, 2000). A portal therefore is a collection of objects (information bricks) and services (operation on these bricks) that can be accessed from the portal (web) page.

Portals can be adapted for specific communities and sometimes users can tailor them to their needs. More sophisticated systems like PostNuke or PhPWebSite offer a good set of core portal functionalities, such as a good user administration system, a news/journal system, web links sharing, search, FAQs, Polls and more. In addition, an impressive amount of extra modules (many from autonomous developers) like collaborative hypertexts (wikis), pictures galleries, simple content management systems, event calendars, chats, project managers, file-upload, glossary management are available. Many web-applications popular in education that existed beforehand as stand-alone applications (e.g. Forums and Wikis) are adapted (or being adapted) for integration into portal systems like PostNuke.

Our survey on educational use of these portals came up with very few hits, however awareness of their educational potential (and in particular of Weblogs) is growing among various stake holders like software providers (e.g. Gilroy 2001, Fox 2000), teachers (e.g. the "Ford" Site), researchers (e.g. Ashley 2002), educational technology support (e.g. Davies 2002). It is also noteworthy to point out that there exist thriving niche markets for specialized applications like Wikis which have and can be easily used for a wide range of rich scenarios (Guzdial 2000). What can be learned from this

CoWeb/Swiki CSCL-as-authoring-experience (Guzdial, Rick & Kehoe 2001) is that teachers are open to radical new pedagogies provided that the technology is simple and effective and under their control. Since C3MS systems have a modular and an extensible architecture they can be adapted/combined/configured to many specific usage scenarios". Teachers can set up the portal from an increasingly large set of "core" or 3rdparty modules. There exist documented APIs for programming plugin modules and we hope that over time, some modules specially made for educational purposes will "appear". We also may program our own.

We use the term "C3MS brick" for a component that takes care of a specific task, can be easily separated from others, can be configured and administered, can be combined and orchestrated with others and all this through the main core portal environment (with the exception of a few). In order to present the "world" of portals to the teacher community, we established a companion document about C3MS bricks (Synteta, Schneider & Frété 2002) that teachers can combine into educational scenarios like the ones presented above. Let's present an example of a C3MS brick from this catalog:

Generic name(s)	News/Articles/Topics/Sections
Software names (Postnuke centric)	News, Submit_News, Story Submission Module, Topics Newsletter, NewsPortal, PN Rapido Stories, PN Submit News PDHTML
Functional Description	Submit news, display the news on the index page, post new articles or stories or topics on the site. Functions: Submit, comment, edit, delete, rate, search, browse, moderate
Structural Description	This is a core module of most portals but there exist also some 3rd party ones with special features
Pedagogical interest	Interact by providing new information (to start a story, a project, an activity), comment information of others, asynchronous debate, present an expert's view on a theme
Construction process	Exists by default in the main menu
Other Notice	Can be commented
Support for activities	Brainstorm, IntroWork, SendFeedBack, SubmitStory, SubmitComment

These catalogs have been strongly inspired by Guzdial's and al. (2000) work with CoWeb, but we are not yet at a stage where we can present an empirically tested catalogue. We hope to observe and report interesting experiments within the next 2 years and we will replace the static on-line manuals by some more flexible hypertext/database system allowing faster and cooperative updates and comments.

While managing contents is not central to the argument of this paper, it is an issue for teachers. Portals can be particularly useful to manage informally generated knowledge, e.g. the result of educational activities. Good knowledge management (KM) will be instrumental for open e-learning and community of practice building since it promotes just-in-time open learning, i.e. helping people to find information from it in order to get some job done. Portals usually have incorporated search engines, some have functionalities for rating information, so that good information "floats" to the top. For more structured information, e.g. web links, hypertexts etc. there exist special applications that allow users to make quick updates (instead of going through the process of editing HTML files and uploading them).

SEEDING & DIFFUSION STRATEGIES & OUTLOOK

For this project we decided to use a "from the middle out" strategy. We initiated a few field experiments (3 project portals, 1 teacher portal and 1 pupil portal) in order to gain some practical experience with this new technology and we just started co-designing educational activities. On an other level, we presented our "activities" and "bricks" catalog to a larger set of teachers. Inspired by Guzdial's work with CoWeb, we start by presenting simple activities that do happen in school and that can be enhanced with C3MS but at the same time we also introduce portals as community tools (for project or teacher support. Shown interest has been high, but there are technical bottlenecks: deploying portals within the official school infrastructure require sometimes difficult negotiations, most C3MS software is not fully stable and finally installing and configuring a portal is not easy. We expect most of these technical bottlenecks to be solved within the next 1-2 years, but we are aware that the main issues are related to pedagogical practice and change.

Technology, in order to be acceptable by the teacher community should appeal to teachers with different levels of technical competence and different levels of "activeness". We discriminate four levels of use with respect to how they appropriate learning technologies: (1) Reusing. Teachers who appreciate ready-to-use material. In our case, this is a scenario that has been instantiated with content. (2) Editing. Teachers who feel the need to modify the content of a scenario they appreciate. (3) Designing. This means in our case to compose completely new scenarios by re-assembling basic components. (4) Programming. Some teachers like to program and we can expect them to develop modules. The same teacher could borrow objects at levels 1, 2 or 3 at different times according to his availability, his familiarity with the environment, and his involvement in the community. In other words, we believe that teachers ought to be able to work according to their technical skills, to their personal investment, to what is available.

So far, we do not know yet the full potential of C3MS. One major limitation of using C3MS portals seems to be the lack of provision for integration (and in particular data-flow) between applications which are required for more complex CSCL scenarios which we wish to tackle in the future by using more complex server technology such as portlets or the Cocoon 2 architecture. Another limitation concerns management of contents, activities and people over time: How can we efficiently enough "reset" or move some of it so that fresh activities of the same kind can start with an empty slate while keeping past student production available to new students.? Some of these issues can be dealt with by careful planning of module use and naming, as well as differentiated write access permissions. In other words, handling these issues require the same sort of planning that a traditional user-driven educational site does. But certainly, things could be improved and automatized to some degree.

This research sponsored by the European "Seeding cultural change in the school system through the generation of communities engaged in integrated educational and technological innovation" (SEED) project is at its beginning stages. So far, we have looked at recent Internet Success stories (such as Weblogs, Interactive Information Portals, Wikis), tested several software systems and initiated a few field experiments. We plan to support further sites, prepare more dissemination materials and hope to report first in-depth experiences within the next 12 months. We are also aware that C3MS portals are not the answer for more complex CSCL workflow scenarios. However, we think that there is an important need to actively support educational scenarios requiring less complex technology and that can be used for other interesting purposes such as community building. In addition, we can feed insights gained from experiments with C3MS portals into a more ambitious project to build a CSCL authoring environment.

SUMMARY

We do believe that there are new opportunities for socio-constructivist scenarios such as the ones we describe in our “catalogue of socio-constructivist learning activities”. C3MS offer much functionality that teachers are keen to have (like news/comments, forums, simple CMS and others that we describe in our catalogue of “C3MS bricks for socio- constructivist scenarios”). Since this technology is focused on “orchestration” and not content delivery, we believe that it will spread with almost the same ease as web pages did, but it will bring new functionalities. Teachers should have control over their environment and this fits the C3MS philosophy. Finally, C3MS may be a chance to maintain the Internet Spirit in education, which is threatened by the philosophy of so-called educational platforms, e-learning systems or whatever are called today’s main stream systems sold to education.

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Cocoon Home Page. http://xml.apache.org/cocoon/index.html

The Interactive University: A Future Model The Public University in the Digital Age http://interactiveu.berkeley.edu:8000/newIU/

Postnuke Content Management Home Pages. http://www.postnuke.com/

phpWebSite Open Source Content Management System. http://phpwebsite.appstate.edu/index.php

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