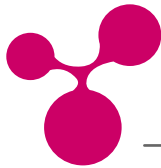Technische Universität Dresden – Fakultät Informatik
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E.2 Learning Management Systems as a Tool for Community-based Project Management

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Abstract

This paper addresses a new conceptual framework for a community-based project management learning model that aims to support learning within a project and enhance the distribution of knowledge within a particular virtual community. This model also aims to develop a virtual community of doctoral students, who can manage their own projects online with other community members who have the same interest. In order to develop that model, a checklist of community-based project management process has been developed in the light of the literature review and the needs of stakeholders (doctoral students and researchers). Within this model, community-based project management includes three main elements: community, project and management. In relation to project, there are two main sub elements. First is project-based learning (PBL), which is based on constructivist perspective of learning that make students construct their knowledge when they work together to accomplish specific goals. Second is the project management body of knowledge (PMBOK), which is a project management guide, and an internationally recognized standard [PMBOK Guide, 2004], that provides the fundamentals of project management as they apply to a wide range of projects, including construction, software, engineering, automotive, so the study deploy this approach to scaffold based project management learning model. In the terms of the community element, this study adopted the community of inquiry model, which defines a good e-learning environment through three major aspects: cognitive presence, social presence and teaching presence. The last element which is addressed in this study called knowledge management. After identifying these elements, this study investigates a range of tools in the light of this model. The study analyses six different learning and content management systems (OPAL, Moodle, Joomla, e107, ZMS and TUDWCMS) in order to find out tool(s) that is/are sufficient for implementing the suggested study model.

Keywords:
Project based learning, learning management system, virtual community, community of practice.

1 Introduction

The core aim for this paper is to build a virtual community for researchers and doctoral students that enables them to manages their project online within the community-based project management model (CPMM). This model of learning depends on three main principles: project based learning (PBL), community of practice (CP) and project management (PM), to achieve virtual projects that enable researchers to co-ordinate their work online. They can share documents and discuss results in various ways of communication, for example chat, newsgroups and Wiki etc. In fact, more than 50 % of information systems projects fail [Dorsey 2000], despite high performance technology, because they are insufficiently accepted by users. So this study suggests a framework for building sufficient system that depends on users "scaffold" and needs in order to build and create virtual community for doctoral students and researchers.

As part of the process of managing an educational project online, many students and teachers adopt some popular tools to manage their project online. Such are learning management system (LMS), learning content management system (LCMS), social software (e.g. Wiki, Blog, etc.). Others use virtual networks (VN) which are sometimes labeled as "virtual community" (e.g. Facebook, StudiVZ, etc.). A pilot study was implemented to investigate the use of these tools among doctoral students. Here 40 doctoral students in Egyptian and German universities were asked about their use of these tools and their needs. The result indicates that most students (65%) use these tools for exchanging information and meeting with other friends. There are also some specific uses that belong to their research process (35%), such as learning resource exchange, job search, events organization, research and tools search. In relation to doctoral students' needs, the study identified some needs. Such are related to project implementation, community interaction and management. In the light of doctoral students' views and needs, the study model has been developed in order to facilitate community based project management learning.

In the same direction as this study there have been a number of attempts to build virtual communities with some meaning for project work. For example, in Germany, we find the EU-funded project called "GARNET" [Brocke 2008]. The aim of this project is to build an electronic platform that provides a Virtual Network to enhance the possibilities for cooperation in the "Network of Excellence (NoE)" and to improve information access. In addition, the platform offers a public space and a higher visibility for the GARNET network and its research findings. The development of an electronic platform for the NoE should not only be seen as the construction and

delivering of a technical tool for the members of the NoE. The acceptance by users is the most important argument to be made for the integration of community-building and intercultural aspects into the developing process of technology. Thus, the way of building software for the electronic platform is designed as a progression and as a part of community-building itself. This project also included 3 stages of infrastructures which are an expert-database, the file sharing and the contents.

Another project is "THESIS" [Thesis 2007] which has 650 members. Although it is considered to be a database for researchers and doctoral students in Germany, it is difficult to describe it as a scientific virtual community. Another limited attempt is the "Doctoral Forum", which offers services for researchers and doctoral students regarding academic writing [Veelken 2009]. Specifically this site provides assistance for doctoral students such as: (1) work with dissertation in terms of writing, formatting and changing the supervisor, (2) dissertation with Microsoft word and (3) literatures resources and search engine services.

In the following we will introduce and discuss the three basic theoretical concepts of Project-based learning, Communities of practice and Project management.

2   Project based Learning (PBL)

Project-based learning is grounded in general theories of knowledge such as situated learning. This states that knowledge must be presented in an authentic context, using settings and applications that would normally involve that knowledge, and includes social interaction and collaboration to solve complex problems. However, the focus on collaboration for problem-solving has led to some confusion between project-based learning and problem-based learning [Prince 2007]. At the graduate level, problem-based learning can include the creation of an artifact, such as a research paper, a business case or a software application to earn a grade or points for the team producing that artifact. Thus the final product is of critical importance [Williams 2009].

Teams are considered to be the basis for the association of software development these days, as development teams commonly distribute the work among their members by following well-defined structures of interdependent responsibilities, with typical roles like designers, testers, architects or project managers [Benarek 2005]. In this setting, professionals are not only required to have state-of-the-art knowledge and technical abilities, but also to be able to cooperate successfully inside teams. Effective teamwork requires mastering specific abilities, such as leadership, organization and conflict managing. This implies that if higher education wants to meet the requirements of the students' future professional lives, it has to address the acquisition of such soft skills and has to have the technology to support [Rugarcia 2000].

This paper presents project based learning process as a guide to build a new concept of virtual community based upon the following charactersitics:

- recognize students' inherent drive to learn the project work is central rather than peripheral to the curriculum;
- in depth exploration of authentic and important topics;
- use essential tools and skills;
- including technology for learning;
- self-management and project management;
- specify products that solve problems;
- explain dilemmas or present information generated through investigation, research or reasoning;
- include multiple products that permit frequent feedback and consistent opportunities for students to learn from experience;
- use performance-based assessments that communicate high expectations, present rigorous challenges and require a range of skills and knowledge;
- encourage collaboration in some form, either through small group;
- offer student-led presentation or whole-class evaluations;
- adopt a team project also to deploy tools and strategies that virtually serve the project team.

3   Community of practice (CoP)

Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly [Wenger 1998]. He views learning as a social process, which shapes not only what we do but also who we are and how we interpret what we do. Wenger was mentioning that the term community of practice was coined to refer to the community that acts as a living curriculum for the apprentice. He identifies three key components of the work of CoPs in developing this living curriculum: domain, community, practice and brokering across the boundaries of the community. The following sections summarize these three components:

3.1   Domain:

According to [Wenger 2002], a community of practice is not merely a club of friends or a network of connections between people. It has an identity defined by a shared domain of interest. Membership therefore implies a commitment to the domain, and therefore a shared competence that distinguishes members from other people. The domain according to this study is the doctoral students. Therefore, students contribute to and learn from discussion around the uniqueness of their community through all sorts of activities. Such include their reflections on their teaching experiences, informal sharing of experiences, sharing resources that support thesis and researches, sharing of events, conference alerts, writing papers, a supervision corner, a research tool request side etc.

3.2   Community:

In pursuing their domain, members build a community through engaging in joint activities and discussions, help each other and may learn from each other in this informal setting. In a study it has been found that when working with one teacher in one school, little progress was noticed to students learning [Sammaras et al. 2008]. Teachers had no opportunity to discuss their ideas or share their practice. Indeed the research involves teachers of different age groups and subject areas who could bounce ideas of each other. A second reason for community is changing practice, as teachers need the support of the group. Community in this study is also important for doctoral students in terms of informal learning which includes sharing advice and ideas about research and its techniques, practice: field studies, research papers, statistical analysis, case studies, activities, supervisory, projects, exams, resources and data collection. This suggested peer network can provide support for students who found themselves to be 'in the same boat'.

3.3   Practice and brokering:

The third characteristic of learning within a CoP relates to the practice itself, a shared repertoire of resources: experiences, stories, tools and ways of addressing recurring problems - in short, a shared practice [Wenger 2004]. These important elements might be viewed as providing scaffolds for the more complex professional learning that is needed. As noted before those are fundamental to the conception of communal constructivism where students provide a lasting and ever-growing legacy for current peers and for future members of the community. CoP theory provides a theoretical basis for this, although Wenger's framework arguably extends further in space and time, with community members 'crossing boundaries' to other consultations of interlinked CoPs. The practice will also build by and through all of the activities mentioned above, both formal and informal sharing of Ph.D. lab environment[1]. Online interactions are thus multicontextual, crossing the boundaries of both communities and provide potential for them to engage in 'brokering'.

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1 Online platform "researcher design": http://phd-lab.com

4   Project management

A project is a temporary endeavor undertaken to create a unique product, service or result (Project Management Institute 2004). This study in the terms of project management engages doctoral students and researchers to begin developing an overall plan for managing their project. This plan may include a schedule, budget, research plan and/or list of needed materials, equipment and resources. There are some indications that the project management Body of Knowledge [Project Management Institute 2004] can provide structure to virtual team projects in a variety of disciplines, while retaining the learner-driven character of project-based learning. In a study of virtual teams in an undergraduate psychology class [Chiocchio 2007] there is little evidence about the effectiveness of the project management methodology in providing the conceptual and procedural scaffolds that would enhance online project-based learning processes and outcomes. Specifically, there is a need to explore the impact of embedding project management tools and templates within the virtual learning environment as procedural scaffolds to clarify specific project-related tasks while learners are working within that virtual environment [Kao 1996].

The process of project management that were adopted in this study can be divided into two main categories: the project management body of knowledge (PMPOK) versus the project organization. The project management body of knowledge (PMPOK) includes process such as:

-   integration (develop project charter, develop preliminary project, scope statement, develop project management plan, direct and manage project execution, monitor and control project work, integrated change control, close project);
-   project scope management (scope planning, scope definition, create webs, scope verification, scope control);
-   project time management(activity definition, activity sequencing, activity resource estimating, activity duration estimating, schedule development, schedule control);
-   project cost management; project quality management;
-   project human resource management; project communications management;
-   project risk management; project procurement management;
-   project organization includes process: infrastructures (hardware, software, support and architectures), human recourses and leadership and process of project (planning, analysis, design, development, implementation and evaluation).

5   Community-based project Management Model (CPMM)

This study develops a new conceptual framework and methodology for learning via project that depends on three different perspectives in learning and management. The first perspective is related to project based learning (PBL) and the second is the community of practice (CoP). The third perspective is project management (PM). The aim of this model is to support doctoral students in achieving their project goal through engagement in online communities that can enhance their communication, improve academic writing, trigger activities, help with academic presentation, give access to literature resources, build project groups, etc. The basis of this model is to establish a scientific community for researchers and doctoral students. In order to build this model, the content of some related literature has been analyzed and process for community based project management could be identified. The following figure highlights the main elements of the community based project management model (CPMM):
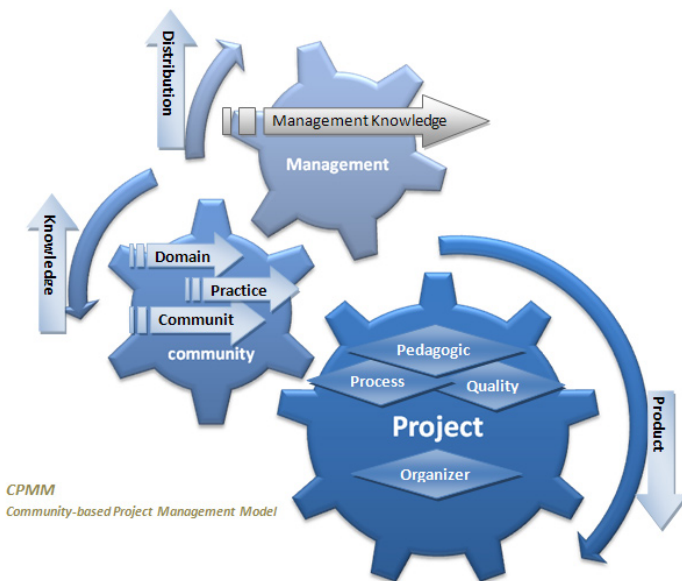

Figure 1: Community-based Project Management Model

6 The role of learning management system (LMS) for community-based project management

A Learning management system (LMS) is a software system designed to support teaching and learning. A LMS typically provides tools such as those for assessment, communication, uploading of content, administration of student groups, questionnaires, tracking tools, wikis, blogs, chats, forums etc. over internet. LMS range from systems for managing training records to software for distributing courses over the internet and offering features for online collaboration [TEIA 2000].

A LMS is a software that facilitates the so-called e-learning (electronic learning). Such e-learning systems are sometimes labeled differently. They are also called 'virtual learning environment' (VLE), 'course management system' (CMS), 'learning content management system' (LCMS), 'managed learning environment' (MLE), 'learning support system' (LSS) or simply 'learning platform' (LP). Overall it is education via computer-mediated communication (CMC) or just online education.

The progressive adoption of learning management systems in higher education to let students and lecturers manage their distant interactions through has not been of much help. This overall virtual organization may improve students' use of time, but it also reduces the social interchange that could require the use of soft skills [Sanch 2009]. While teamwork has grown to be somewhat of a buzzword in the corporate world, companies often make only a superficial effort to actually create a trusting team environment. Many education managers using a learning management system continue to foster competitive work environments, believing that the strongest will rise to the surface (Coggno 2008). Learning management system can be used not only to assign teams and individual tasks, but can organize teamwork skill training. Teamwork courses hosted on a learning management system can be an effective tool in performing these functions.

The study investigates a number of learning management systems (LMS) in the light of the process that had been developed in order to identify their appropriateness for applying it toward community based project management. The following table provides an analysis of six different LMS in the light of the CPMM Process.

Table 1: an analysis of 6 LMSs.

Moodle[2]

Project based learning	Community building	Management	Ease of use	Sum
8/8	33/43	17/20	13/17	71/88
100%	76%	85%	76%	80%

OPAL [3]

Project based learning	Community building	Management	Ease of use	Sum
0/8	12/43	4/20	4/17	20/88
0%	27%	20%	23%	22%

Joomla[4]

Project based learning	Community building	Management	Ease of use	Sum
3/8	43/43	16/20	11/17	71/88
37%	100%	80%	64%	80%

E107[5]

Project based learning	Community building	Management	Ease of use	Sum
4/8	26/43	13/20	10/17	53/88
50%	60%	65%	58%	60%

ZMS[6]

Project based learning	Community building	Management	Ease of use	Sum
3/8	11/43	13/20	5/17	32/88
37%	25%	65%	29%	36%

TUDWCMS[7]

Project based learning	Community building	Management	Ease of use	Sum
0/8	3/43	6/20	3/17	12/88
0%	6%	30%	17%	13%

According to table (1) this study analyzed and evaluated six learning and content management systems (including: Moodle, OPAL, Joomla, E107, ZMS and TUDWCMS) to identify the extent to which they fulfill CPMM model process. There are some clear differences between the LMS, which had been tested in the light of CPMM model of learning. Results indicate that Moodle as a learning management system as well as Joomla [Joomla 2009] can be judged as learning content management system to a high extent. Both systems met 80 % of the CPMM process. In addition, both Moodle and

2 http://www.moodle.org

3 https://bildungsportal.sachsen.de/opal/dmz/

4 http://www.joomla.com

5 http://e107.org

6 http://www.zms-publishing.com/

7 http://tu-dresden.de/hilfe

Joomla have a huge public and support community of users and developers, e.g. the official forum for Joomla (as of writing) has over 110,000 members, statistic imply that there are somewhere between 10 and 40 million websites that are using Joomla today in different fields. Joomla has also many add-ons for different uses. This study tested the joomla project management add-on which is called "Flyspray JE (Joomla Edition)" as a tool to implement project based learning and to manage tasks and projects. This tool does not require a high level of experience neither to install nor use it. In addition, for community systems, this study tested "social community system by Azrul" as one of the free add-ons for Joomla designed for building a community. In the second system Moodle study investigated on of open souce Moodle add-ons labeled as Activity Module (project-based learning tool), which is Project Flexible sequencing of five modules-brainstorm, signup, submit, schedule and assessment.

The study results show that Moodle has a high potential for project based learning (100%), higher than Joomla, because it has a specifically add-ons for managing project based learning. On the other hand Joomla has a strong and sufficient system for social community building, it assigned a rank 100% than Moodle. OPAL, which is the official e-Learning platform of TU-Dresden, has only a minor potential 22% for project based learning and community building. The other systems score around that value: E107 with 60%, ZMS with 36% and the TUDWCMS with 13% with low rates for all study process. The reasons for that result might be related to a number of factors. For example, E107 has small user community and it is suitable for small and personal project, ZMS is simplified for content modeling and is used officially in TU-Dresden, but it is almost not a sufficient tool to meet study process. The last system (TUDWCMS) is only open for content management of the TU Dresdens webportal but is not open to be used by other parties.

Conclusions

This research highlights the needs of doctoral students and researches for building a specific social virtual community network. The study also investigated the needs of community members (doctoral students and researchers) in different fields and institutes in Egypt and Germany. Following the analysis of their needs and the analysis of the related literatures, this study developed a new model for community based project management which is based upon the three basic theoretical concepts of Project-based learning, Communities of practice and Project management. In the light of this model, a number of process have been developed in order to build an effective virtual community based on project management. Finally the study analyzed 6 learning and content management systems (Moodle, OPAL, Joomla, E107, ZMS and TUDWCMS) to have a decision which platform has sufficient tools and add-ons to implement the learning model of this study. The study recommended two systems that have sufficient tools to build and implement CPMM model, Joomla as a learning content management system and Moodle as a learning management system.

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Appendix 1: CPPM Technical Process

	Joomla	Moodle	OPAL	E107	ZMS	TUDWCMS
Project Process						
Project management add-on	yes	yes	no	no	no	no
Task analysis	yes	yes	no	no	no	no
Polls	yes	yes	no	free add on	yes	no
Surveys	free add on	yes	no	free add on	no	no
Database Reports	free add on	yes	no	free add on	yes	no
Expense Reports	free add on	yes	no	no	no	no
Project Tracking	free add on	yes	no	free add on	no	no
Graphs and Charts	free add on	yes	no	no	yes	no
Management						
Web-based Style/ Template Management	Yes	yes	limited	yes	no	no
Inline Administration	Yes	yes	yes	no	no	no
Online Administration	yes	yes	yes	yes	yes	no
Workflow Engine	no	yes	no	no	yes	yes
Asset Management	yes	yes	limited	yes	no	no
Web-based Translation Management	free add on	yes	yes	yes	yes	no
Package Deployment	no	yes	no	yes	yes	no
Clipboard	no	yes	no	no	yes	no
Trash	yes	no	no	no	yes	no
Sub-sites / Roots	yes	yes	no	no	yes	yes
Content Scheduling	yes	no	yes	yes	yes	no
Advertising Management	yes	no	no	yes	no	no
Themes / Skins	yes	yes	limited	yes	no	no

Web Statistics	yes	yes	no	yes	no	yes
Content Staging	no	yes	no	no	yes	no
Extensible User Profiles	yes	yes	yes	yes	no	no
Multi-lingual Content	free add on	yes	no	yes	yes	yes
Multi-lingual Content Integration	free add on	yes	no	yes	yes	yes
Metadata	yes	yes	no	yes	yes	yes
Multi-Site Deployment	Free Add On	yes	no	no	yes	no
Community						
Discussion / Forum	free add on	yes	yes	free add on	no	no
Blog	yes	yes	no	free add on	no	no
Photo Gallery	free add on	yes	no	free add on	no	no
User Contributions	yes	yes	no	yes	no	no
Product Management	yes	yes	no	free add on	no	no
FAQ Management	yes	yes	no	free add on	yes	no
Link Management	yes	yes	no	free add on	yes	no
File Distribution	free add on	yes	yes	free add on	no	no
Events Calendar	free add on	yes	yes	free add on	yes	yes
Time Tracking	no	yes	no	no	no	no
Contact Management	yes	yes	no	free add on	no	no
Mail Form	yes	yes	yes	yes	yes	no
Data Entry	free add on	yes	yes	no	yes	no
My Page / Dashboard	No	yes	no	free add on	no	yes
Classifieds	free add on	yes	no	free add on	no	no

Guest Book	free add on	yes	no	free add on	yes	no
Help Desk / Bug Reporting	free add on	yes	yes	free add on	no	no
Groupware	free add on	yes	yes	no	no	no
Syndicated Content (RSS)	yes	yes	yes	free add on	no	no
Tests / Quizzes	free add on	yes	yes	free add on	no	no
Document Management	free add on	yes	no	free add on	no	no
Chat	free add on	yes	yes	free add on	no	no
Job Postings	free add on	yes	no	no	no	no
Web Services Front End	yes	no	no	no	no	no
HTTP Proxy	no	no	no	no	no	no
Search Engine	yes	yes	yes	free add on	yes	yes
In/Out Board	no	yes	no	no	no	no
Graphs and Charts	free add on	yes	no	no	yes	no
Wiki	free add on	yes	yes	free add on	no	no
Newsletter	free add on	yes	no	free add on	yes	no
Site Map	free add on	no	no	free add on	yes	no
Stock Quotes	free add on	free add on	no	no	no	no
Weather	free add on	no	no	free add on	no	no
Matrix	no	no	no	no	no	no
Events Management	free add on	yes	no	no	yes	no
Shopping Cart	free add on	no	no	free add on	no	no
Subscriptions	free add on	no	no	no	no	no

Pluggable Shipping	free add on	no	no	no	no	no
Pluggable Tax	free add on	no	no	no	no	no
Pluggable Payments	free add on	yes	no	no	no	no
Wish Lists	free add on	yes	no	no	no	no
Inventory Management	free add on	yes	no	no	no	no
Point of Sale	free add on	no	no	no	no	no
Ease of Use						
Email To Discussion	free add on	yes	no	no	no	yes
Macro Language	Yes	no	no	yes	no	no
UI Levels	Yes	yes	no	yes	no	no
Template Language	yes	no	no	yes	no	yes
Server Page Language	yes	yes	no	yes	no	no
WYSIWYG Editor	yes	yes	yes	yes	yes	yes
Friendly URLs	yes	yes	no	yes	no	no
Undo	no	yes	no	no	no	no
Drag-N-Drop Content	no	yes	no	no	no	no
Spell Checker	no	free add on	no	no	no	no
Subscriptions	costs extra	yes	yes	yes	no	no
Image Resizing	yes	yes	no	yes	yes	no
Mass Upload	yes	yes	yes	no	no	no
Prototyping	yes	no	no	no	no	no
Zip Archives	no	yes	yes	yes	yes	no
Style Wizard	no	yes	no	no	yes	no
Site Setup Wizard	no	no	no	yes	yes	no

---End---