A Framework for Building Virtual Communities for Education

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Abstract. The aim of education is to provide the basis for life long learning and improvement. In this direction, schools and universities offer standard curricula aiming to cover the fundamental needs of their students in a few years scope. On the other side, institutes and companies offering life long education focus on improving specific skills and competencies of people in a short period of time. Obviously the aims, capabilities and availability of attendants vary significantly, since they usually have to cope with their morning work and their family duties. As a matter of fact, several issues, such as the limited duration of training programs, the loaded schedule of trainees, the inevitable absences due to other obligations, the multitude of topics to be covered, the variance of attendants' interests and needs, have to be considered in order to create a competitive training program. In order to support attendance and inform people on the topics, requirements and aims of programs we need a flexible program structure and an infrastructure that delivers information, training material, and support on demand, in a daily basis. We believe that a single institute is not always capable in coordinating such a composite effort and we capitalize on the building of a virtual community for education. Community will comprise training institutes, educators and trainees who will interact and co-operate in order to achieve maximum gain and flexibility.
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1   Introduction

The evolution in networks and hardware and the advances in software integration, allowed educational institutes and organizations to join forces and offer advanced courses to people. In the same time they have the infrastructure required to monitor and support students either from distance or in contact. In the same time the work performed in educational standards and course design software [13],[14] allows educators to build modular educational material and exercises and compose flexible course scenarios [10] and programs [6] that fit to every student's needs.

In the scope of life long education, people search for training opportunities in order to cover their needs at work, enhance their skills' profile and shift or push their career. On the other side training institutes strive to find space, time and people (educators) and organize them efficiently. Educators should have profound knowledge and be capable to teach multiple topics, classrooms should be available and well equipped all the time in order to support a group or a single student. The institutes must provide flexibility in the delivery of training programs which could last from a weekend to a

few months. The same topics should be covered, although in a different level of detail. Finally, institutes should provide side-support, offer additional material and exercises to trainees and give them the ability to demand new programs.

For all the above reasons, we consider that a flexible framework for offering education and training is crucial for life long learning. A *community framework* will allow the collaboration of institutes and management of trainees and training programs and will facilitate the cooperation of educators and trainees. In this paper we present the main directives for developing a virtual learning community, which incorporates educators, trainees and institutes and offers reading and training material and packaged training solutions. We discuss the main issues concerning the design, operation and administration of this community and focus on the features and services it should offer. We present technical solutions with minimum cost and portray the merits of this approach through the prototype application of a virtual learning community for a postgraduate programme.

The next section presents the fundamental concepts of contemporary education and virtual communities and is an introduction to the framework presented in section 3. Section 4 illustrates the prototype application of this framework into a virtual community of postgraduate students and focus on implementation details. Section 5 discusses major operational and administrative issues of our prototype that apply to all virtual learning communities. Finally, section 6 summarizes the gains of the community approach for institutes, educators and students and provides useful insights for the success of a larger learning community.

2   Fundamental Concepts: Education and Communities

Life long education covers a wide range of ages and comprises all official, unofficial and informal learning methods [12]. It also refers to any learning activity through life that aims in improving knowledge, skills or dexterities. Education can be supported or not and support can be provided in vivo or from distance. The motive behind this personal improvement is either social or professional or both [1].

In **distant education**, the reading material, courses and support are offered using network technologies to distant students all over the world [5]. The supervision and guidance of students in real-time is optional, however the duration, the educational targets and the tasks to be performed are predefined.

In **open education** all learning tools and materials are available to the student. The syllabus, tasks and targets of a program can be modified at students' will. In open education, autonomous learning is favoured [9]. Moreover, students' needs and capabilities affect the structure, duration and tempo of an educational program. Open education can be delivered from distance or not, is delivered to groups or single students and allows students to interact with the programs' structure. The term 'open' has a second meaning, referring to the ability of anyone to participate in a program.

Virtual communities (or internet communities) are defined as groups of people with common interests and practices that communicate regularly and for some duration in an organized way over the Internet through a common location or mechanism. **Virtual learning communities** share many features with the pre-

mentioned concepts [7]. First, all community members have a common interest: education. Second, Internet is the carrier and network technologies the supporting infrastructure. Finally, the idea of 'open' is tightly related to virtual communities, since anyone interested in education is a potential member for an learning community, and is likely to communicate his/her opinion to other community members.

A review of the existing solutions in education reveals the power and flexibility of communities [8]. The undeniable gain from using communities in education springs from the increase in membership. However, increased participation results in augmented administrational and operational costs and risks. Since the main aim of the community is defined, the next step is to define the community borders: the contributors and members, the roles and rules of the community. In the following, we present in more details the framework for establishing a virtual learning community.

3   A Virtual Community for Education

The success of a community is measured in the degree of its members' participation. Since the members carry all community tasks, the definition and assignment of roles, duties and rights to members is crucial. In opposition to virtual enterprises and organizations, the definition of rights and responsibilities in a community is not strict and changes according to members' need and participation. Active and capable members of a community are promoted or assigned new roles. Members that do not contribute are restricted, demoted and set aside by other members. Potential members of a learning community are students, people that need training, trainers and tutors, researchers seeking to exchange knowledge, universities and institutes that offer training and companies that produce educational material and software.

The building blocks of the community are *students* or *trainees*. They join the community in order to attend an educational program and obtain knowledge. They request for training in side fields unrelated to their studies and receive support and guidance by other community members or experts. *Universities* and educational *institutes* are the community motors. They assemble educational modules into targeted programs and guide students and trainees to improve skills. They undertake the administration of the community and in parallel monitor and facilitate members. They study the members' needs, design and offer courses and direct members to the appropriate knowledge. Individual *educators* and *researchers* are able to offer their expertise to the community, always under the administrators' control. The anatomy of a learning community is depicted in figure 1 and explained in the following.

In order for the community to thrive, the harmonic cooperation of all members must be achieved. The system should consider the particular needs and targets of life long learners [3]. The community should be able to adapt content and courses to the match changes in the work environment and rapid technological expansion. A *profile base* where members' skills, needs and educational targets are recorded is very useful in the design of new courses or seminars. The analysis of members' profiles will give better educational solutions and create competitive groups of learners.

A "*knowledge base"* [11] will contain educational material organized by topic, course scenarios, educational solutions, program evaluation reports, answers to users'

requests etc. Educational programs must comprise reusable learning objects that can be easily recomposed or transformed to fit each employee needs. The use of learning objects facilitates the monitoring of content, since it is easier for institutions to rate the quality and suitability of content uploaded by educators. Additional training material can be added by authorised members, only after evaluation.
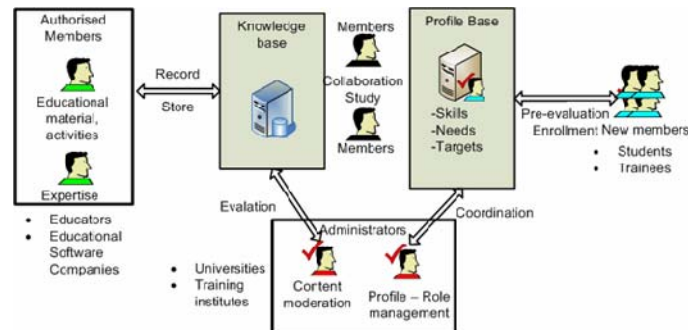

Fig. 1. A learning community

Finally, the power of the community resides in the ability of members to collaborate. It is essential in this case to build a *collaboration environment* and encourage members' interaction through group activities. In such activities, distant members of a virtual class are forced to communicate, to participate in synchronous activities, to split composite activities into tasks and work in subgroups etc.

4   A Prototype Virtual Community for the Education

In order to strengthen our belief on the power of virtual communities in education we established a community supporting a postgraduate program held in our university. The program, was entitled "Virtual Communities Socio-psychological Issues and Applications" was a joint effort of the university with one technical university and one research institute. Tutors from the three institutions had different theoretical background (psychologists, sociologists and computer scientists) and orientation and the same happened with the students. All courses were performed at the university place, whereas tutors could be in distant places. The community members were divided into professors and students. However, administrative and coordination tasks were held by the registrar.

In order to advertise the program we created a web site with general information. Additional information concerning every day activities of each course, news and announcements of interest to the students were hosted in a free web space server (web log) and only registered community members were allowed to update or comment. In an effort to delegate administration tasks, we created what we call the "weblog umbrella" (Figure 2). Web logs are easily updatable websites where administrators can post messages by filling a few forms and without special knowledge on web

design technologies. We created separate web logs, hosted into free web servers, one for each course. The *course tutors* could add short notices or announcements and manage the comments or posts of the community members. The *students* were permitted to comment on the tutor notices thus providing them with useful feedback. Weblog *visitors* were able only to read announcement or comments. On the top of this set of weblogs we created an additional weblog for the whole program, in which community members were able to post messages. The program web log was accessible for the program web-page and provided links to all program courses.
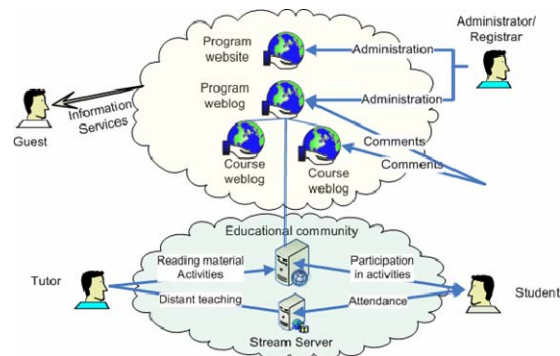

Fig. 2. The prototype learning community structure

The main educational activities of the community were supported by an open-source web application (Moodle: http://moodle.org/), which was accessible for students and tutors. In the majority of courses tutors used the community application solely for provided reading material to students. However, in several courses, students and professors employed the forum, chat and news services in order to coordinate their actions. We have completely tested the activity services provided by the application, which is on our plans for the upcoming semester.

Finally, using the technological infrastructure of the university's teleconference room we performed distant courses from one of the joint institutes. Tutors and students were interacting using real-time video over a streamed media server.

4.1 Applied Course Scenarios

In the scope of the post graduate program, we setup several educational activities for the students and employed as many of the community software facilities as possible. In a certain course we asked students to form subgroups in order to carry out the assignments. Using the "Form sub-groups" option of the software we divided students into teams that could discuss the assignment issues in private. Although, all the other students were not able to watch the private discussions, the tutor could monitor the activities and coordinate each group.

In another course, students were provided with individual weekly assignments. In order to provide additional support for the assignments, the tutor arranged an online

group meeting once a week with all his students. During the online meeting the tutor answered questions, provided consults and gave directions.

Apart from the course activities, tutors used the poll services of the community in order to trigger their students' interest. The students used the same services in order to perform surveys among their classmates and visitors.

5   Administration and Operation

In this section we present a walkthrough for the design of a virtual learning community according the aforementioned framework, and based on our experience from the program.

5.1   Roles

The first step is to define the members and their roles. As explained in section 3, anyone can be a member in an open community. More specifically, ***student-members*** should provide their educational profile in detail in order to be accepted. A pre-evaluation procedure will give educators a better view on members' knowledge and skills. Universities and institutes are expected to provide the community with content, guidance and support. As a consequence, ***administrators*** are selected from these institutions and are responsible for managing members' profiles and evaluating content. Some ***tutors*** are assigned with the task of producing new educational material upon request. The same people carry out a ***moderator*** role in the community services. Additional material can be obtained from volunteers out of the community borders.

Apart from the educational subjects, members need technical support on the use of the community services. The technical staff of the institutes will initially become the community ***facilitators*** [15]. However, regular community members with technical expertise can be accredited this role. The role tasks comprise the editing of help files or user manuals, the answering of frequently asked questions and the response to members' requests for help. Facilitators will help new members, either students or tutors to get accustomed to the community services and take full advantage of them.

5.2   Services

The community must build a gateway for people or companies outside its borders that wish to cooperate with the community. ***Information*** services are the front-end of a community. A web site with informative material on the community activities, sample courses, contact information and a feedback form will allow companies or individuals to offer content and potential students to reach and join the community.

Simplicity in the use of services is another factor that increases participation. New members are attracted by an easy interface and request for more advanced services only when they become accustomed to the community. Unfamiliar members can easily become disappointed by complicated services and leave, unless they have the proper support. *Support* is another important factor for a successful community [2]. It can be established by providing informative material to members (online tutorials, manuals, frequent questions and answers etc.) and by assigning guidance roles to

selected existing members (facilitators, moderators etc.). **Communication** services (synchronous or not, private or public) are vital to all community members: to educators for coordinating their collaborators, guiding and supporting their students, to students for discussing about assignments and requesting help on activities.

Collaboration services are very useful when they are coupled with educational activities. A group project turns autonomous learning into a collective activity and helps students to improve their analytical and collaboration skills. An activity, which flourishes in educational and knowledge sharing communities are wikis. A wiki is the collaborative coverage of a topic from the members of a community. Any member can contribute or modify the content under conditions (proper reason, provide references etc.). Other collaboration services comprise, virtual workbenches, virtual blackboard etc. The results and history of collaboration services are usually stored and used as a reference by other community members.

5.3   Operational Issues

The aim of the community is to help members improve their profile. It is essential for educators that the students profile is real and that their virtual identity is consistent. ***The validity of the educators' profile*** information is also crucial for students [4]. Since educators have a mentoring role, it is important that they definitely posses the knowledge and skills they declare. The ***validity of content*** is strongly connected to the quality of the community and should be considered wisely. The administrating institutes are responsible for the validity of both educators and content. An authorization mechanism is sufficient to guarantee the constant member identity and to protect community from unauthorized users. Administrators are responsible to continuously monitor the freshness and usage of content and in parallel test the capability and knowledge of tutors in order to proceed with updates. They should also build the students' profile and analyze the profiles evolution in order to create and suggest new training programs.

A usually neglected aspect of virtual communities relates to their expansion plan. The expansion in the structure of a community can be bi-directional: a) ***sub-groups*** can be formed inside the community, thus increasing its complexity and the need for internal management and administration, b) ***new members*** can be added, thus expanding the borders of the community. The creation of sub-groups is an additional burden for the administrators of the community. Although the existence of sub-groups generates the need for additional services and increases managerial tasks, it is essential for educators and students to work in harmony. The self-administration of sub-groups is more convenient for the administrators of the community, however limits control over the group activities.

6   Conclusions – Benefits and Future Work

The gains from the use of a virtual learning community are many for universities and students. Students have the ability to exchange empirical knowledge while carrying out learning activities. Tutors can increase the consultation time through forums, they share their knowledge and contribute to the guidance of members more easily. When communities are in contact with companies, they receive information on new products

and reading material thus promoting professional excellence of educators. As a result members work smarter that harder, communicate expertise to new members and acquire maximum benefits. The benefits from the use of communities are the main motive behind the participation. The benefits for the educational institutes are mostly organizational and strategic. They cooperate, expand their borders, advertise their programs easier and with minimum cost and increase their potential students. Universities are the focal points of the community, since they provide support and guidance, and they define key knowledge areas.

It is in our next plans to increase the activities of our community and create new educational scenarios that fully exploit the community infrastructure. We have already planned several wiki activities, which we expect to activate students in a daily basis and interact with each other frequently. In the same time we intend to analyse the users' behaviour inside the community in order to detect what is attractive and what is not for the students, what possible flaws in courses result in decreased participation and finally to evaluate the usability of the provided services and interfaces.

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