Computer-facilitated Community Building for E-Learning
Panel Introduction

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Abstract

This is a short survey of tools and ideas that are helpful for community building for E-learning. The underlying assumption in the survey is that community building for students and teachers in a joint learning and teaching situation is useful. Especially student-student interaction in student life is important. Can we introduce tools that do not only 'allow' student-student interaction in an E-learning environment, but also stimulate such interaction and permit students to design their own way of interaction, including several degrees of implicit or explicit access to information they possess, their ideas, their attitudes and feelings, their appearance, etc. Apart from allowing more natural interaction between individuals, this information may help in building and providing group knowledge, knowledge that has been constructed from frequency, characteristics from interactants, and from the contents of interaction. Members of the community can profit from such information as well. What is known about a particular teacher, which student usually gives useful advice, what are the characteristics of students who take a particular course, etc? Tools can help to: assign reputations to individuals, provide recommendations based on frequent interactions, extract information from individuals (based on their interactions or based on questioning), promote awareness of others in the community, etc. In order to design tools that are effective we cannot restrict ourselves to tools that 'just' allow statistical analysis of interactions. We need to interpret interactions from an intelligent and affective point of view. We need modalities that allow students to display knowledge and subjective feelings about the learning environment and about themselves. Our aim in this paper is to motivate the readers to build on the ideas that are available in the literature. Ideas are available, but certainly not in a way that allows an integrated viewpoint from which to start the design of an e-learning community with student interaction that resembles interaction in real-life student life communities.

1. Introduction

Student/student interaction - in addition to student/content and student/teacher interaction - is an often-neglected form of interaction in distance learning. Present technology allows the building of highly interactive instructional environments. These environments allow collaborative work and tools can be offered to facilitate interaction between students and teachers and between students. Students who are distant from each other can nevertheless help each other, share experiences, exchange information and even design alternatives for the tools offered by the 'official' provider of the environment.

Tools to design, maintain and extend virtual communities, in particular online collaborative tools to support different forms of interaction, are being developed in research on virtual community building. The ability to forge sustaining relationships that result in community is essential and it requires tools that go beyond the usual chat environment, threaded discussion boards and (asynchronous) email that can be added to course management tools. They may include recommendation systems, reputation systems and more specific tools to promote community awareness.

These new tools allow more informal social interaction and they are not necessarily text-based only. For example, they may include icons, photographs, and objects in the shared and visualized environment that change in size and appearance (depending on frequency of contact, depending on group appreciation, depending on mood, depending on desired emotion display, etc.

A possible next step is that students and teachers can be represented as 3D avatars that inhabit the virtual environment and where apart from allowing collaborative tasks, preferences and interpersonal relationships can be visualized in the behavior, the communication and the knowledge sharing a student allows. Synthetic actors can be added to these environments, including personal assistants, mentors, an 'ideal' student, teammates, etc. Communication between inhabitants requires tools to

express emotions, humor and self-disclosure in order to support building interpersonal relationships. The community should become part of student life.

In the next sections we survey different ideas and tools that have emerged in the recent literature. We first look at tools for social navigation (section 2) and then discuss in section 3 tools that increase social awareness and allow communication and knowledge sharing between members of a learning community. In section 4 the emphasis is on new technology – virtual reality, avatars, intelligent agents – that can be used to design media and communication rich environments.

2. Communities and Social Navigation

Users of online communities can obtain help from other users. Reputation systems use knowledge that has been – implicitly or explicitly – been provided by the users. Activities, preferences and information about the knowledge of users can be collected, ranked and matched against information from an individual user looking for help, advice or a social chat. Clearly, the characteristics that make up a reputation system need to be chosen with the aims of the online community in mind. For example, sometimes help can be provided by presenting average results of all users, sometimes it is useful to distinguish different subgroups of users, sometimes one-to-one help might be provided by the system. In [6] different types of reputation information valuable for social online environments are discussed. As argued there, in a social context peer-based recommendations are especially important and are predictors of positive relationships.

Table 1 shows some different types of reputation information that can be collected. Generally, with these reputation systems the users characteristics (including personal taste) are translated to 'averages' that are used to make recommendations. Obviously, it is also possible to obtain useful recommendations by looking at content or meta-data. Content-based techniques include natural language or SQL querying, information filtering, case-based reasoning and content-based category selection. Combination of prediction strategies has been shown to be useful [14].

An obvious content-based technique is to have a system that supports finding the right person in the community to help a particular user. An illustrative example of the latter is the I-Help [15] system developed at the University of Saskatchewan. I-Help is an internet-based peer-help system that is used by hundreds of students at the. Underlying I-Help is a multi-agent architecture. Each student has a personal agent; there are application agents and also a matchmaker agent that maintains profiles of the students. If a student has a question, his personal agent contacts the matchmaker agent who then determines which other online students qualify for giving help. The matchmaker negotiates with personal agents of available students about willingness, taking into account credits that can be earned. Some experiments with this virtual help market have been done, but due to technical and organizational problems no widespread use has been reported yet. Among the many interesting issues are the introduction of a virtual economy, including negotiation strategies, the possible translation of virtual currency to real world equivalents (Social prestige? Recognition by teachers? Better marks?) and the observation that more proactive and pedagogically intelligent agents that monitor the students behavior might be useful since students often lack the metacognitive skill to recognize when to ask for help. Obviously, this will be more the case in a network that is meant to offer help in problem solving tasks that are part of assignments than when the network is used as a community that can provide help for making decisions on which courses to follow or on social problems related to the study.

	Informal indication	Explanation
Ranking Systems	Rank in community	How much community members like interacting with this person, on average
Rating Systems	Rated by community members	How long and how much this person has participated in the community
Collaborative Filtering	Has similar interests to me	How well your interests and activities match up with those of this person
Implicit peer-based	Interacts with my friends	How often this person interacts with one or more of your friends
Explicit peer-based	Rating given by my friends	How much your friends like interacting with this person, on average

Table 1. Reputation Information (from reference [6], with permission)

3. Promoting Community Awareness

'Presence', as defined in [10], is the perceptual illusion of nonmediation, that is, 'a person fails to perceive or acknowledge the existence of a medium in his/her communication environment and responds as he/she would if the medium were not there.' There is a rich literature on factors influencing presence. Social richness is one of them, but also the naturalness of being able to communicate with others in the environment.

Lack of social presence introduces a feeling of anonymity and possibly negative behavior (exploiting bugs, privacy infringement, virus distribution, flaming). People behave differently in the presence of other people than they do when they are alone. Commitment and trust increase when there is knowledge about other users and when they have to communicate and to cooperate to maintain and improve the environment. Introducing synthetic social actors in the interface or visually representing (online) community members may further increase the feeling of presence and increase the user's commitment to the community. As an example of experiments in this area we mention [3,7] where the effect of availability of profile information in computer mediated communication and the effect of the mode of communication (text chat versus text-to-speech synthesis) is studied.

Obviously, profile information can come in different forms. In [13] the CoMeCo project is discussed. Here, the community members' knowledge is represented in associative networks. New knowledge can be captured and integrated. Members of the community are represented as so-called virtualized egos and through these egos other members can get access to this knowledge.

Generally, community members should contribute to the community, among others by sharing their knowledge and perform community tasks. Sharing knowledge may also include adding content to knowledge bases of educational material. Being able to do so, in an unmoderated way, may also increase social responsibility. In [8] two communities are reported that provide users with tools that are usually only available to moderators or server administrators. These tools allow users to track the interaction and contribution history of members and to get information that make them understand reputation systems as mentioned above.

Being able to display online for every member what is going on in the community requires additional tools. Again, apart from increasing awareness it helps to provide members with useful information about others and their activities and to contact when desired the right person at the right time. What is going on means: what changes are there, which interactions take place, what are members doing, etc., but also (the announcement of) joint activities in which to take part. Community tools for these purposes have developed from simple Internet tools to detect online status of other users. Visual and auditory cues about tasks and individual and group interactions (lectures, meetings, auctions) can be displayed in real-time in community interfaces. Static contact information (see e.g. [11]) can be visualized. Different metaphors can be used to show temporal patterns in interactions.

As an example of this type of visualization we mention the EDUCO system [9]. Documents and document clusters presented by icons and users are represented as colored dots near the documents they are currently viewing. Types of user profile are indicated by colors. The documents can change color depending on how much they are read. Users can set alarms to trigger events, e.g. if a user arrives at a document, they can initiate chat discussions and they can form ad-hoc study groups.

4. Towards Media-Rich Communities

Are there other ways to increase social awareness or introduce new facilities for community members? We shortly mention some community design ideas that are slowly becoming possible because of technological advances. Rather than using standard graphical user interfaces these communities allow multimedia presentation of information and several forms of visual and audio user representation. User interaction with these communities can also make use of non-standard input modalities (speech, gestures, motion capturing, etc.).

There has been a development of chat and game environments (entertainment environments) and CSCW systems (solution-seeking groupware) towards virtual worlds with visitors that can 'see' each other, interact with each other, collaborate and learn [12]. 3D Virtual reality communities may allow students to build their own home in the world and to visualize information they have to offer. They can introduce their own avatar and in a 3D multi-agent environment also (embodied) personalized agents that can be sent away to gather information, to negotiate with other members' agents or to represent the student in visualized interactions or cooperation.

An example, rather using simple avatars than embodied intelligent agents, of an environment in this direction is INVITE (Intelligent Distributed Virtual Training Environment) [2,4]. This is a current project of the Information Society Technology (IST) Program of the European Commission. INVITE aims at making collaborative e-learning possible using distributed 3D virtual environments technology and avatar technology. The design of the learning environment includes lecture rooms for synchronous training, subject-specific collaborative rooms for collaborative training, private rooms for asynchronous training and an entry room for informing members about activities. Photo-realistic avatars will represent the users, allowing simple gestures and mimics as well as display of (real-time) movements. For teachers and students tools will be offered for chat and audio communication, application sharing and whiteboard communication. Teachers will be offered administration and moderation tools.

We conclude by mentioning two other recent approaches. A virtual lecture space aimed at immersive learning is in development by Arita et al. [1]. Here students and tutor are assumed to wear head-mounted displays and

headphones and motion capture systems take care that their poses and gestures are reflected in their avatar agents in the virtual lecture room. However, no typical community goals are pursued in this research. Finally, in addition to having students and tutors represented as avatars and in addition to having (embodied) pedagogical agents, it is also possible to introduce agents that know and learn about the community and can interact with the members. An example is Cobot, a reinforcement-based learning agent that gathers social statistics and learns about individual and communal preferences of users [5].

5. Conclusions

In the panel discussion for which this paper serves as an introduction we would like the panelists to present their work and ideas in the area of community building for E-learning and to discuss future developments, including educational, (social) psychological and technological aspects. Issues we propose to be discussed are: reputation systems, display of online activities, support for community awareness, the role of multimedia, including virtual reality, and the interplay between community and learning activities. We may also discuss the following questions: Doesn't our community design and tool characteristics prevent people from taking part in the community? Are their groups of students who feel inhibited rather than stimulated by this new technology? Moreover, how can we prevent that majority preferences in a community are stressed too much? Wouldn't we rather stimulate curiosity, stimulate to deviate from groupthink, draw attention to divergent opinions and preferences, just like teachers can do?

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