

Learnet—A Model for Virtual Learning Communities in the World Wide Web

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Computer mediated communication (CMC), a central feature of cyberspace, is also a key resource for the creation of innovative technology-based educational environments. However, the real significance of these environments for education is still unclear. Our aim in this paper is to propose a particular educational configuration based on CMC technology, the Learnet, based on the combination of three components: a virtual community (social dimension), hosted by an appropriate virtual environment (technological dimension), and embodying advanced pedagogical ideas (educational dimension). The dimensions and variables of the Learnet model are presented, and applied in the analysis of four examples of Virtual Learning Environments in the Web. We conclude suggesting that environments encompassing the features of the Learnets model may promote learning processes based on members' personal interests, willingness to participate, and motivation to interact with peers, teachers, and other knowledge sources within a dynamic learning community.

Computer mediated communication (CMC), a central feature of cyberspace, is also a key resource for the creation of innovative technology-based educational environments (Bonk, Appleman, & Hay, 1996). However, the real significance of these environments for education is still unclear. Due to novelty, there is a lack of consensus about terms, definitions, and conceptual approaches regarding networked educational environments. Our aim

in this paper is to propose a particular educational configuration based on CMC technology: the Learnet. We argue that a Learnet is a novel educational system based on the combination of three components: a virtual community (social dimension), hosted by an appropriate virtual environment (technological dimension), and embodying advanced pedagogical ideas (educational dimension).

The distinction between the social aspect (the members of the community) and the technological aspect (the infrastructure) of virtual communities was already proposed by Jones (1997). Here, we further elaborate this distinction, and propose the inclusion of additional pedagogical layers, in correspondence with the particular needs and goals of virtual communities aimed to serve educational purposes. We hope that our analysis will help in designing a taxonomy of Learnets and help in developing new educational systems on the Net.

ROOTS OF LEARNETS

The Social Dimension

Community—Definitions. Jones (1997) reviews a variety of definitions of the term *community*. The *Dictionary of Sociology* claims that the term is too vague to have a specific meaning, but to begin with we shall refer to the entry on “community” in the Random House *Dictionary for the English Language*:

- A social group of any size whose members reside in a specific locality, share government, and have a common cultural and historical heritage.
- A social, religious occupational or other group sharing common characteristics or interest, for example, business persons, scholars.

These definitions suggest a distinction between two types of communities: a place-bound community and a interest-bound community. In a place-bound community, members do things together in the same place and at the same time. We might think about religious congregations that use specific places (a synagogue, a church) for meeting and engaging in common activities. Interest-bound members share values and beliefs and develop relationships not in reference to a place but through communication (e.g., a professional association whose members have common interests, act according to

common rules) via phone, mail, and meetings that may take place in different locations. Though these are different types of communities we may observe that the role of membership in both cases is based on members' sense of affiliation, their use of a common terminology and their involvement in varied types of interaction.

Support for this dual meaning can be found in Farenback and Thompson's (1995) survey. In discussing the different interpretations given to the term community they point to the evolution and change in its perception and definition. Their argument is based on an historical approach suggested by Sennet (1977), who argues that in the past a community was associated with a particular territory, while in the modern meaning a community means a gathering of "like-minded individuals."

Virtual communities. If a community is either place-bound or interest-bound, could virtual communities too, be classed in these terms? First we should consider the meaning of *virtual* as an adjective describing the nature of the community. Heim (1993) defines virtual as real in effect but not in fact. By that definition a virtual community can not be restricted to a certain physical/spatial place. The question is whether common interests and shared ideas could be a sufficient condition for establishing a virtual community. Or should it be associated to a new kind of place? And if so, how do we define this place?

In contrast to the space-related approach other researchers emphasize the social aspect of virtual communities. Rheingold (1993) defines a virtual community as a social aggregation which emerges from the Net when enough people carry on public discussion long enough, with sufficient human feeling, to form a web of personal relationships in cyberspace. Bruckman (1996) uses the term "off line worlds" where social organization exists. Jones (1995) suggests that as sharing communication is the main bond, the focus shifts from sharing a "space" to sharing feelings. Common interests are designated by Toffler and Dyson in the *Magna Carta for Knowledge Age*, as the knot which ties together participants in cyberspace. Moreover, Dyson emphasizes the presence of give-and-take interactions as a crucial condition for the evolution of a community. Members should feel that they have invested in the community and therefore are part of it. The social dimension of the community is supported by a psychological condition. The elimination of physical features in cyberspace determines the social relations in the virtual community. Suller (1996) stresses the fantasy aspect (like acting in a dream) which eliminates the need to occupy concrete physical places and be recognized through a particular physical appearance. For example,

virtual communities develop a certain social atmosphere that is based on social relations among characters that users create as their virtual representatives (avatars). The relations are formed between representations of real people, between minds and forms of thought as conveyed by avatars. Turkle phrases it: "We reconstruct our identities on the other side of the looking glass" (1995).

The Technological Dimension

New form of space. The new electronic space, cyberspace, is a new spatial form which exists on the Internet. Early references to this electronic space were made by MacLuhan (1964) in his work on the characteristics of the emerging "global village." He pointed out that new social structures come into being as a result of communication technologies that foster the creation of electronic communities which abrogate space and time. Twenty years later Gibson (1984) coined the term Cyberspace to denote a "place" where new forms of virtual communities evolve as information entities. As Negroponte (1996) states it, bits take the place of atoms and molecules. This space derives its novelty from its ability to create the notion of a certain space though being "anyspace" (Harasim, 1995). The new space might be considered as third place, in addition to work or school, and to home. Real-life third places are characterized most of all by its regular clientele and is marked by a playful mood, which contrasts with people's more serious involvement in other spheres (Oldenburg, 1991). These features of real "third places" might be compared to CMC based environments, where people regularly spend a great portion of their free time in a variety of communication-based activities (Reingold, 1993).

The infrastructure of cyberspace. Jones (1995) uses the term *settlements*, and Turkle (1996) the term *neighborhoods* to denote places hosting virtual communities. The spatial component appears essential for the perception of a community as a social entity. Regarding virtual communities, their spatial infrastructure and constituents might be defined in terms of the technological features of digital networks.

Because of the essential link between the social aspect (the community) and the technological aspect (CMC technology) there is a tendency to mix up these two dimensions in the description of the virtual community. For example, when discussing the nature of virtual communities some refer to Usenet (Baym, 1995; McLaughlin, Osborne, & Smith, 1995; Reingold, 1993),

to e-mail and BBS (Harasim, 1995), or to discussion groups (Khan, 1998), which are all basically technological resources. All CMC tools the literature mentions when describing virtual communities are actually the infrastructure needed for its existence, but as such they should not be treated as virtual communities. Jones (1997) proposes to distinguishing clearly between the virtual community and its cyberspace, namely, the set of resources and tools comprising the digital environment of the community.

The Educational Dimension

Learning environments in the Internet come under various names in the literature, for example, learning environments, virtual learning environments, learning communities, or virtual learning communities. For further discussion on pedagogical features of Learnets, we shall look beyond all these terms, and clarify what the main educational characteristics of existing learning sites are.

The general use of the expression “virtual learning environment” refers to any educational site on the Internet that includes information, and/or learning activities and/or educational assignments or projects. Most of these sites do not pursue the creation of a learning community. The term *virtual* is used in a general mode, for example, the possibility to access the site from any place at any time, thus eliminating some of the physical constraints of the real world. These Websites offer a varied range of instructional modes: from the retrieval of curricular resources to be integrated in the regular classroom activities, to complete educational units existing only in the Web and serving online distance learning. Today, sophisticated versions of educational Websites comprising information resources, didactic solutions, and technological tools, are offered as complete learning environments. And because the term “virtual” has become a buzzword in cyberspace, these Websites are commonly termed *virtual learning environments*.

Learning communities and virtual learning communities. Schools are by definition learning communities. They exist in a certain place in which the community’s activities are performed, they develop systems of rules and symbols which help members to identify with the place. As learning communities schools are place- and time-dependent. They also usually decide the way students should learn, with whom, and at what pace.

What characterizes Web-based (or virtual) learning communities? A Canadian survey (1998) defines two types of virtual learning communities: Geographically- bounded learning communities and interest-bounded learning communities. The first are based on existing communities (like schools), and they use the capability of the online technology in order to support these communities (1998). In 1996, 300 such learning communities were functioning (Schuler, 1996). The educational advantages of the network relate to the support and enrichment it provides to the real communities.

Interest-bounded learning communities were established through CMC and use the network as the meeting "place." These communities are totally dependent on the virtual environment in which they exist, and act like distance learning courses.

LEARNETS AS VIRTUAL LEARNING COMMUNITIES

In this article we would like to develop a different model of networked learning environment on the basis of the previously described kinds of educational sites. We suggest to develop Learnets as a combination of:

- A virtual learning environment as the technological infrastructure which modifies the physical term *place* to online reality.
- A virtual learning community as a social entity with no local or spatial boundaries.
- A pedagogical framework.

Jones (1995) proposes four conditions that a virtual settlement (environment) should fulfill: (a) the capacity to manage interactive communication; (b) people who communicate; (c) a place for public interactions; and (d) a membership. While the first and the third conditions are technology oriented, we claim that the second and the fourth are descriptors of the community and not of the hosting environment. We argue that a clear distinction must be made between community descriptors and between environment descriptors. In the following passages we will further elaborate on this distinction between social and technological features, as well as on the additional educational layer of Learnets.

Features of the Learnet's Community (Social Dimension)

A community relies primarily on people. What features contribute to their socialization and consolidation as a community? We will focus on the following attributes: sense of belonging, extent of presence, and status definition.

Sense of belonging is the basic attitude upon which the linkage among individuals develops, thus leading to the foundation and maintenance of the community. Individuals who feel committed to the community develop varied forms of interaction with others who feel alike, and contribute to the community's functioning.

Extent of presence is a quantitative description of the frequency, duration and periodicity of members' participation in community activities. This description is based on data regarding the members' number of visits, duration of each visit, and time elapsed between visits to the community environment.

Status definitions are organizational procedures that regulate the social system's structure and functioning. Sets of rules define different roles for the members (e.g., full members, guests, administrators, wizards) and the levels of activity, services, and authority related to each status. Like in the real world, order is needed and institutions that manage the place are important for its existence. A member status is the result of the interplay between community regulations (e.g., conventions, rules) and individuals' decision to register as members and define their level of participation and commitment.

Features of the Learnets' Environment (Technological Dimension)

Technology-based attributes crucial to the evolvement of a virtual community are: immersivity, multi-user options, variety of communicational means, meta-level design.

Immersivity. If a virtual environment is to be an alternative to physical places where people meet, then the visitor should feel as if she/he were "going inside" or "being there." This feeling must be so strong that it temporarily eliminates the sense of being physically in another place, or the awareness of looking at the computer's screen. The question of how we might induce this feeling is still open. One possibility is by simulating reality, as is done in many virtual reality games. Another option is to create a new (virtual) reality, a cyberspace, without walls, without time zones, for which digital-world rules

are created governing the behavior and functioning of the environment components. Either way, the use of multiple representational means of varied levels of sophistication is crucial. 3D graphics, live video, sound, or virtual reality devices all offer great opportunities for the creation of highly immersive environments.

Multi-user options. To achieve a community, it is not enough to enroll many communicators. It is the technology which enables the communicators to collaborate, that counts: they must be able to talk to each other, to act, create, and produce together, to share knowledge, and so forth. A Mud exemplifies a technological solution that supports social functioning. Likewise, environments such as The Palace, Virtual Places, or Active Worlds are technological systems that enable collaborative work among members of the hosted virtual communities.

Variety of communication means. Communication is quintessential to networked environments. It is through the use of varied and efficient communication means, allowing both synchronous and asynchronous interactions, that the community's social atmosphere evolves. For instance, communication conventions based on characters available on the keyboard were developed by Internet users (e.g., using bold or capitals represents a tendency to force yourself on the group; "netiquette" rules). Different communication options will support different modes of activity for different types of members.

A meta-level approach. While developing a virtual environment a meta-level overview is needed. A global design of the environment is vital for creating the notion of a place which has open spaces rich in social opportunities, on one hand, and specific private corners for individual activity, on the other. The feeling of being in a spacious place, which includes different "attractions" is important for promoting frequent visits and social interaction. The existence of private places makes the place suitable for different visitors with different needs and interests. We also argue that a place that has different sections but also maintains a unity creates a sense of stability and helps the visitor to feel easy and comfortable.

Features of the Pedagogical Framework (Educational Dimension)

The educational implementation of any novel technology seems to follow an interesting pattern regarding pedagogical solutions. In the first stages prevailing pedagogical models, which were created by means of previous

technologies, are adapted for use with the new technology. Then gradually new didactic forms evolve, taking advantage of the unique characteristics of the new technology for the realization of pedagogical claims. For example, the programmed instruction model was first adopted for the development of the first computer-based tutoring systems (Venezky & Osin, 1991). But gradually features such as the possibility to construct sophisticated branching algorithms, to supply immediate relevant feedback, or to generate interaction templates other than structured question-answering tasks, resulted in the development of complex pedagogical solutions in the form of CAI tutoring and training systems. Later on computers were introduced as cognitive partners (Pea, 1987; Salomon, 1988; Turkle, 1984), as partners in the social learning supporting the ZPD theory (Vygotsky, 1978) and computer-based construction was introduced as an alternative to instruction (Papert, 1980).

The same evolution pattern can be expected to occur regarding network technology. So far most educational Websites seem to be built upon pre-Web pedagogical models, taking little advantage of the powerful traits of the new technology (Mioduser, Nachmias, Oren, & Lahav, in press). For instance, in most sites the prevalent representational structure still resembles the linear sequence of content units typical of the print technology; communication activities (e.g., interactions among peers or with experts) are rarely included; and student interactions with the content are mostly limited to browsing and the occasional answering of structured questions. Looking for didactic models, which capitalize on the unique features of the Web technology, we suggest to focus on content, instructional and learning aspects of Learnets.

Content-representation aspects. The web structure (i.e., non-sequential, highly interlinked clusters of information units) demands a different approach for representing curricular content than does the textbook approach. The conception and design process of Web-based learning materials should produce innovative models regarding curricular issues such as organization, sequencing, indexing of raw materials for recurrent use in different configurations according to different learning goals, or qualification of links to allow different browsing paths for different students.

A second key issue regarding content-representation relates to representational means. We suggest that for the learning system to realize as fully as possible the characteristics of virtual environments, the use of representational means that support immersion, involvement, and interactivity (e.g., 3D graphics, virtual reality devices, sophisticated feedback devices) should be stressed.

To refer to the extent to which the pedagogical model of a site is constituted upon representational structures and means characteristic of the Web

technology, the variable *hyper-curriculum* was included in the Learnets model.

Instructional aspects. The possibility to access the network from any place, at any time and stay as long as one wishes, supports the distributed character of the learning community. Tools like e-mail and discussion groups, as well as multi-user tools (e.g., IRC, chat, online conferencing, MUDs) enable members of the community to share accumulated experiences and knowledge (Collins, 1998). Didactic configurations promoting collaborative work and group learning are sustained by the CMC tools embedded in the environment. At the same time, the specific needs and interests of each individual are taken into account, so that both individuals' autonomy and democracy of learning are supported. In addition, multiple roles and functions (besides direct tutoring) may be performed by educators in the networked community (e.g., moderating discussion groups, scaffolding, coaching).

Regarding the relationship between the real classroom and the virtual environment, several parameters appear to be relevant: the time invested in learning; whether it was compulsory or chosen on the basis of individual or group interests (i.e., a Web-based project done in school may be short-term and compulsory; a distance learning course is based on free choice, but usually it has structured assignments and is constrained to defined time tables; a variety of activities offered as enrichment or as an alternative to classroom activities such as research projects, communication with peers, moderators and experts, or edutainment activities, are chosen by the learners and may become long-term activities); whether it is a Web-only activity or complements the use of regular classroom resources. Based on the previous considerations, three relevant variables concerning instructional aspects are considered in the Learnets model: support for *collaborative learning*; *virtual/classroom* relationship; and the *networked-educator's function*.

Learning aspects. As members of the learning community, students are expected to participate and contribute to its academic and social development and functioning. Learning in the community implies dense and multifaceted interactions: with the content, with peers, experts, and educators.

In addition, a variety of parameters related to the character of the learning transactions may be controlled by the learner (Morrison, 1995), for example, place (where to communicate from), time (when), mode (kind of activity), role (who/what am I), pace (stages), or level of learning. The degree and quality of *Interactivity* is the variable in the Lernet model that relates to these aspects of the learning process.

The Lernet's Dimensions and Variables

A summary of the different aspects of Learnets results in the scheme of dimensions and variables shown in Table 1. Each variable was assigned a scale of four values, from 0 to 3, according to its specific characteristics.

In the next section we will use this scheme for the analysis of a number of selected Websites.

Table 1
Variables of the Lernet Model

Dimensions		Variables	0	1	2	3
		Community	Sense of belonging	none	class registration	personal registration
Extent of presence	none	occasional	within a course	guests' rights	full members' rights and duties	
Status definitions	none	predefined				
Technology	Immersivity	text-based	2D graphics	2 1/2 D graphics	virtual reality – 3D graphics	
Multi-user options	none	—	—	—	collaborative work	
Communication means	none	e-mail	asynchronous	synchronous	yes	
Meta-level features	no	—	—	—	yes	
Pedagogy	Hyper-curriculum	book	internal links	external links	web structure	
Collaborative learning	none	collaborative work in classroom	collaborative work between schools	collaborative work with peers		
Virtual/classroom relationship	mainly classroom activity	virtual/classroom complement	information retrieval projects	mainly virtual activities		
Educator's function	Classroom teacher	experts	virtual tutors + classroom teacher	virtual tutors		
Interactivity	browsing	activation and observation	question answering	telem-manipulation/ java/ vml		

ANALYSIS OF SELECTED SITES BY MEANS OF THE LEARNET MODEL

Several models of Virtual Learning Communities are currently evolving within the World Wide Web. Some develop in Websites that complement existing educational institutions, either formal (e.g., schools, universities) or informal ones (e.g., museums, community centers). Other models develop in sites that were built entirely as virtual environments (e.g., virtual schools, distance learning sites). Some promote interaction among people sharing common professional interests (e.g., teachers, scholars) or assignments (e.g., students enrolled in a course). Yet others evolve in a free and associative fashion in response to the community members' fluctuating interests and aims.

In this section we will apply the variables of the Learnet model to analyze four such virtual learning communities, aiming to assess the extent to which these actualize required features of Learnets. The results of the evaluation of the sites by the variables of the model are presented in Table 2.

CyberSchool (<http://cyberschool.4j.lane.edu>). This is a site that offers accredited courses to schools in order to enable them to "offer students a broader, more flexible curriculum." Students are required to have computer and communication skills, to be highly motivated and willing to invest a certain amount of time per semester in taking the courses.

The courses included a large amount of information and assignments to be done and delivered by means of online forms. The only communication means is the possibility to interact by e-mail with the teacher. To a small number of selected students project-based activities are offered. These projects are evaluated by peers and the students do not get credit for the activity. The project mode includes discussion-group and chat facilities.

Willoway cyberschool (204.186.19.24). A virtual school which is completely administered through the web. Students may participate in the school activities every day from 8-15. The site's design gives a sense of depth and perspective using 2-1/2D graphics. Video conferencing is included as main learning technology. Students are expected to participate daily interacting with teachers and peers through ICQ, e-mail, discussion groups and video conferencing. They are also expected to participate in collaborative projects.

Science Learning Network (www.sln.org). SLN is a consortium of museums that defines itself as an online community of educators, students, schools, science museums, and other institutions, embodying a new model for inquiry science education. The site has a corner that offers professional support to the community of science teachers. In this corner the teachers might present the variety of projects being done in their schools. Likewise,

the site offers facilities for group discussion and chat for teachers who wish to exchange ideas and collaborate on topics related to their needs and interests.

Table 2
Analysis of Four Examples of Virtual Learning Environments

Roosevelt Middle School (www.flinet.com/~rms/). Roosevelt Middle School is a magnet school that has a virtual classroom site which complements the real classes. The information on a variety of curricular subjects is presented in the form of a dynamic textbook in an hypertext style, including links to other sites. Homework assignments are offered through the net and students may connect to their teachers via e-mail. The internet is also used as a place where students' products are published.

Table 3 shows the particular configurations of values of the Learnets variables for each example analyzed. The differences in configuration imply corresponding differences in the overall character of the Website: its goals, focus, main features, and support for community-oriented learning.

CONCLUDING REMARKS

Many sites on the internet define themselves as virtual learning environments, in the most general sense of the notion: a gateway to information and communication, any time and from any place. However, a more detailed analysis of such sites reveals that they do not possess all the features defined in this article as essential for a virtual environment to support a virtual community aimed at learning. We will refer to these sites as quasi Learnets.

Quasi Learnets often have a defined pedagogical approach, but they lack features which are essential for creating a community. Most of them do not even present the building of a community as a goal. Many of them do not stand independently, but rather function as supplements of real institutions. Their environment is neither immersive nor multi-user, even if they use some communication means and their design reflects some meta-level conception of what its overall functioning should be.

If virtual learning communities are offered as a third place in addition to work or school, and to home (Oldenburg, 1991), they should be developed upon novel conceptions and offer unique tools and activity modes, which differentiates them from the other spaces. This environment should supply all the communicational tools needed for developing social relations, tutor-student relations, and expert-novice relations. Likewise, management and moderating functions should be included to support social definitions (e.g., status, roles) and transactions. Thus environments encompassing the features of the Learnets model, may promote learning processes based on members' personal interests, willingness to participate, and motivation to interact with peers, teachers and other knowledge sources within a dynamic learning community.

Table 3
Variables Values Configuration for Four Examples of Virtual Learning Environments

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