# Computers and Education
## Towards an Interconnected Society

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# Learning Communities in the Web: concepts and strategies

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## 1. INTRODUCTION

The emergence of on-line learning communities is supported by the growing culture of participation in the learning activities through the interactional process. Starting from this point, a learning community develops itself in a classroom or on the Web, when all the members of the group, including the teacher or the tutor, are deeply involved in the process of knowledge building, first as mutual engagement in the community formation and then on the development of their learning activities.

Learning communities work as cooperative and distributed systems, that raise from interaction and its effects through the communication among their members.

The engagement of members in a common learning goal, and the specific dimensions of communication in the process of knowledge building, concerning adjustment and the adaptation of individual representations among the members, are some of the aspects that sustain the organisational and learning activities in the community creation. This also draws the development of a culture of sharing and collaborative activities, which defines on-line learning communities. According to Rogers (2000), the main characteristic of the responsibility of the shared learning, promotes the knowledge distribution among the members of the group, and the use of individual knowledge and competencies in the growth and definition of the learning paths of the community itself.

## 1.1 Learning communities

Grounding the educational and organisational model on the social constructivism and on the situated learning approaches, the new on-line communities intend to constitute themselves as experience centres, in which learning is not separated from action, and where the learning process is more aimed at the community than at the individual. In this sense, Wilson & Ryder (1998) refer that the learning communities are alternative metaphors to the traditional education systems. Thus, we consider that learning communities on the Web are alternative educational approaches to the traditional teaching systems, in which the perspectives of development of methods and universal strategies oriented to an effective, sequential and centralised teaching cannot capture the nature of the model of activity in the constructivism approaches.

The organisational model of the community and its functioning promotes the transfer of orientation, control methods and strategies of the learning development for its members, transforming it into a suitable complex system whose first manifestation takes place through multidimensional exploration of meaning construction and in the individual and collaborative adjustments towards a dynamic development of cognitive restructuring.

According to Wilson et al., (1998) this development process is oriented to real and authentic learning situations and includes: the self-organisation in functional communities with a common aim of learning support; the distribution of the orientation functions and of the control of the community activity by the members; and the emergence through the interactions among the group of the roles and member-specific functions.

The nature of the networked interactions on the Web constitutes a favourable environment for the development of learning communities, as the networked principle not only efficiently supports the plan of the interaction dynamics among its members, without limits of time or distance, but it facilitates the development of communicative processes with a collaborative nature in the course of the activities and experiences in knowledge building as well.

## 2. INTERACTION IN LEARNING COMMUNITIES

The absence of centralised control and the mutual influence among the community members follow a model of non-linear interaction, as a network of multiple representations and interpretations that substitutes itself to the logic of the singular and sequential representations in the traditional centralised educational environment.

This framing proposes a reading of the emergent complexity of the non-linear processes in communication and formation systems of the knowledge representations in learning communities, in particular in the absence of a centralised control and in the high interaction and mutual influence among the community members. It is through the interaction that we can observe an appreciation of the collaborative performance in the emergent modes of representation in the learning communities.

The educational development approach through the complexity theories, namely in the organisational activities of learning communities, tries to capture the complexity of the phenomenona and non-linear processes in the mental activity, proposing a new platform for the conceptualisation and modelling the interactive learning and communication environments. This framing, as Tennyson & Nielsen (1998) refer, is based on the conception that non-linearity constitutes a characteristic of the thinking and learning process.

The new education environments should allow the students to question their ideas and beliefs, stimulating in this way the development of an interactive and provocative process in the personal knowledge construction (Parker, 1999). The result of this learning process shows that knowledge construction extends to a variety of sources, from the plan of the collaborative interaction among the community members, to the interaction plan between the student and the *knowledge media*, through the multidimensional exploration of knowledge representation.

According to what has been written, the communication interaction is developed beyond the sharing of knowledge representations, characteristic of the transmission model, to transform itself in a constructive process of meaning making, supporting the efforts and the involvement needs towards a social participation of the members of the learning community (Sherry & Wilson, 1997).

## 3. KNOWLEDGE MEDIA

The knowledge media, according to Eisenstadt (1995), establish a new development model in the relationships between people and knowledge, because they are dynamic and they promote, through this characteristic, the possibility of a deep interaction with knowledge representations. The combination of computer science and telecommunications makes clear that knowledge media are more than means of contents presentation, transforming them in a fundamental condition for the learning communities formation (Berg, 1999).

The dynamics of the learning media is an emergent characteristic of the interaction facilities with the networked representations, whose process transcends the regulating logic of the information delivery of traditional media. We can observe this in the processes of transmission in the traditional paradigm of educational communication.

The knowledge media favours the individual's participation in the sharing of assumptions, beliefs, perceptions and complex representations. In this way, they describe the communication aim, the collaborative knowledge construction that develops when people communicate with each other, through and with the media. In other words, this is a means of transforming information into knowledge through the collaborative sharing of the individual representations and multiple perspectives.

The dynamic perspective of knowledge development in the individual is clearly underlined by the cognitive sciences, which describe it as a complex interactive network of information and competencies, which is developed in the knowledge media through the mutual implication between the media and the learning constructive process, acting like this as an expansion of the student's cognition and interaction networks.

The current cognition approaches are based on dynamic and adaptive phenomena. This approach includes the self-regulation capacity or learning monitoring, the development of the representations restructuring and perspective learning as a constructive process. From this point of view, we must acknowledge the fact that the cognitive system components (or the subsystems) support multiple processes of flexibility and adaptation, which find a favourable atmosphere to its development in an approach based on the network of the interactive media.

The knowledge media are the means to the development of flexible and adaptive representation models, whose importance is fundamental to the understanding of the functioning of learning communities on the Web.

## 4. FLEXIBILITY AND HYPERTEXT REPRESENTATION

The concept of flexibility starts from the non-linear or non-sequential organisation of information proposed to the hypertext systems, by Ted Nelson in the sixties. Based on this emergent theory whose application fields include a growing variety of domains, from communication to learning on the Web, also including the Web architecture, the representation is not a rigid structure, but, on the contrary, a dynamic body of information which shows itself under multiple shapes and suggests, at the same time, multiple exploration paths.

From this point of view, a piece of information is in the origin of a variety of texts, multiple narratives and interpretations, all of them coming from the network which supports the model of information representation and the new place of the reader (user). These (readers as users) move from the traditional perspective in order to be encouraged to intervene in the interacting representation model. In other words, when exploring the network, the hypertext user will be building their own hypertext, according to their previous knowledge, needs and aims.

The hypertext representation is deeply plastic, because the reader develops their own construction through the multiple courses explored by them having larger responsibility in this process. This derives from the exercise of adequate paths selection towards the construction of their own understanding model. This growing autonomy has implications in the students' learning activity and style. While for the traditional media it is expected that the author establishes a coherent and sequential organisation of the ideas and contents presentation that the readers should follow, in the hypertext we find a network of ideas and contents with multiple presentation paths, as well as multiple representation dimensions for the relationships among the ideas. According to this, the hypertext flexibility is the means for the flexibility of learning in the meaning making, as the hypertext network supports the dynamic process of the relationships formation.

According to Borsook (1997), the traditional media discourage this activity, particularly at the exploratory level of the representational dimensions, leading the subject's intervention towards a role of passive acquisition of externally organised models and frequent simplification of the relationships complexity among the information nodes. In the sequence of this perspective, the tendency for simplification which stands out in the development of the learning facts and not in the formation of the relationships among these, remove the student's capacity of focusing their attention on the relevance of the relationships among the ideas. Supporting this type of activity, the hypertext not only presents the information, as the traditional media usually do, as the book, but it also represents it, since it becomes the medium for the development of the relationships network.

The hypertext network acts itself as a semantic network of knowledge representation formed by nodes and links, to which respectively correspond the concepts and the relationships among these. To the hypertext representation, the nodes include from small units to blocks of textual or graphic information and a connection structure that is processed through the entities close to the semantic network links.

The inter-connection among the information units performed by the student, implies that the representation built by them will be an emergence of the complexity of the relationships in the hypertext network, transforming

the learning process, according to Jonassen (1990), in a true expansion of the student's semantic network. The hypertext representation is, though, an expression of the dynamic pattern of the relationships established among the multidimensional nodes, and so a way of understanding complexity. In this sense, Landow (1994) refers that the traditional texts are like limited languages, in which all the parts are known, but not the potential of their combinations, whose complexity is experienced by the reader in the hypertext network.

The authoring perspective in hypertext is based on the relationships construction activity. On the other hand, this dimension characterises the development model of the educational hypertext environments as it acts as the main tool for the construction of the individual and collaborative representations in the learning process and knowledge understanding, only possible through the profound interaction with the hypertext network. The interaction among the hypertext representation system and the student is a process of continuous participation and experimentation in knowledge building, transferring the learning control to the student, through the sustained exploration of knowledge understanding and of its development context.

The flexibility, the multidimensional representation and the learning contextualisation characterise the development dimensions of the hypertext environments that support virtual learning communities, namely in the implication of the experience and of the previous knowledge in the learning transformation process in an expansion of the student's representation models, and in the sharing of these models with the members that participate in the learning contexts. In this perspective, the hypertext environment constitutes an individual and collaborative learning experience zone.

## 5. SITUATED LEARNING AND HYPERTEXT ENVIRONMENTS

One of the most significant changes in the current learning theories proposes that knowledge should be observed not as an abstract and out of context representation, but as a constructive process that emerges from specific situations and contexts (Brown, Collins & Duguid, 1989; Lave & Wenger, 1991; Clancey, 1997).

According to Clancey (1997:1), the situated cognition theory is based on the fact that all the thoughts and human actions are adapted to the environment, being located. This way, what people understand, the way they conceive their activities, and what they do in physical terms, is developed in a conjunct construction.

In this sense, Wilson and Myers (1999) refer that knowledge, learning and cognition are social constructions, expressed in actions of people who interact in the midst of the communities.

The participation is the main element for cognition and for the situated learning, because it requires the development of the negotiation in the process of meaning construction in the different situations and contexts in which it happens (Lave et al., 1991). This process, according to these authors, implies that understanding and experience are in continual interaction, and that the participation notion decreases the distance among contemplation and involvement, abstraction and practice, being, this way, actions, people and the world implied in the thought, in the discourse, in knowledge and in learning, thus accomplishing an immersion process in the contexts of knowledge construction.

The environments that result from this new conception are defined by the learning contextualisation, by the individual decision on the materials to work with, by the identification of the aims to reach and by the community's involvement in the definition of a strategy for the construction and experiencing of the situations and contexts of knowledge production. This approach stands back from the learning conception based on the systematic knowledge acquisition and retention, and competencies externally defined that limit learning to the activity of internal information processing accomplished by the individual (Hannafin, Hall, Land & Hill, 1994; Orey & Wayne, 1997).

The learning perspective based on the information processing metaphor focuses on the knowledge structure and on the structure of cognitive processes, to receive the information and to proceed to its integration in the existing structures, modifying them in order to accommodate the new information. However, and according to this view, the learning thus accomplished frequently results in knowledge isolated from the remaining representations in the mind. This type of knowledge is often referred as inert knowledge, generally not used out of the initial acquisition context (Resnick, 1987; Bransford, Cunningham, Duffy & Perry, 1990; Rogers, 2000). In this sense, the symbolic cognition approach or information processing focus on the individual information processing activity, separated from the culture and from the real learning contexts, treating information as a neutral construct.

However, it is through the development of the participation and collaborative exploration activities of real and authentic environments that the real life learning processes emerge (Rogers, 2000).

The environments based on the theories and technologies of the hypertext and hypermedia representation flexibility constitute a support for the learning contextualization. The exploration activity sustains the learning

accomplishment through the relationship established by the individual and the community members with the different aspects of the social or physical situation, promoting the understanding of the multidimensionality of the representation and of the social factors involved. More than an integration of the individual in the environment, hypertext draws a deep interaction between the individual and the environment.

The development of strategies directed to the collaborative participation and exploration in significant contexts and authentic learning environments are the challenges of this approach.

In the hypertext network representation, the flexibility is the means for the conception of environments. Through these, it is possible to create and to simulate significative learning contexts, according to the principles of the situated learning, favouring the exploration of the several knowledge dimensions, promoting the observation of alternative points of view through the multidimensional exploration of the knowledge representations, confronting the knowledge building with authentic situations, and understanding the problems that the experts find in several areas and the knowledge that these experts use for solving them. In this sense, the hypertext environments are supports for the promotion of the development of cognitive flexibility in the acquisition, organisation and knowledge transfer to new situations and contexts.

The development of competencies of flexibility in the learning process and the creation of knowledge representation models that support cognitive flexibility require flexible learning environments that allow the presentation and the learning of the knowledge items in a non-linear, relational and multidimensional process, favouring the exploration activity, cognitive restructuring and knowledge transfer (Spiro, Feltovich, Jacobson & Coulson 1995; Jacobson, Maouri, Mishra & Kolar, 1996; Dias, Gomes & Correia, 1999; Dias, 2000).

The development of the understanding of knowledge representations results from the exploration of the multidimensionality of the information network, through the continuous exploration and construction of the meaning dimensions which took place in the collaborative environments on the Web.

## 6. COLLABORATIVE LEARNING ON THE WEB

The Web is the virtual place for the development of hypertext-based learning communities through which the interactions with the knowledge distributed in the network take place. Web based learning is deeply influenced by the virtual nature of the social interactions, and also by such

factors as technology and the instructional practices of these learning communities.

The learning community on the Web implies the formation of a flexible and distributed knowledge representation environment, in which the hypertext approach and hypermedia technologies not only are one of the means for the information organisation and for the representations in the network, but also the means of development of extremely powerful collaborative environments for the accomplishment of the learning and for the active knowledge construction. The basic assumption of on-line collaborative learning is to build a learner-centred learning community, that treats the learner as an active participant (Harasim, Calvert & Groeneboer, 1997).

From this point of view, the Web is a means to assist the learning process. In this process the students navigate in the multidimensionality of the flexible and distributed representations, establish relationships among the contents and the community members, through which they participate in a collaborative learning process. The hypertext nature of these environments promotes a wider control of the student on the learning experiences, and also points out the importance of the critical role of the individual aims in the quality and nature definition of the accomplished learning experiences (Wilson & Lowry, 2000). This process promotes the reflection on the new knowledge under the form of the continuous negotiation of the individual representations, that displaces now to the sharing of thought patterns in the learning communities.

The sharing of ideas that emerges from this new dynamics of the networked communication, constitutes the central practice and the defining line of these new virtual learning communities (Berg, 1999). The challenges of this new approach reflect necessarily in the nature and development of the virtual learning community activities, both in the plan of its definition as a group, and in the development of the relationship with the knowledge.

The notion of virtuality is fundamental for the understanding of the organising link in the new learning communities. The absence of the traditional notion of the community sense linked to the physical place is in this case replaced by the sharing in the knowledge construction and renewal among the community members, accomplished through the interactions in the network, not taking into account the physical dimension of the territory and the place as defining traits of the group identity. In this sense, Lévy (1994) refers that this is a community that builds the social bond through the relationship with knowledge.

An effect of the organising link in virtual communities is the development of a culture of simulation, namely through the process of continued renewal of the social bond with knowledge in the Web

communities and, this way, in the construction of a collective intelligence through the collaborative practices of the distributed learning. According to Lévy (1997), the culture of simulation is a specific form of knowledge characteristic to the cyberculture that emerges from the networked practices of communication on the Web, which also draw the contemporary process of mutation regarding the relation with the knowledge, underlining the importance of sharing virtual worlds and complex universes of meaning.

As a support of the virtual groups that constitute the learning communities, the Web is also the medium for the development and proliferation of local narratives, individual stories and communicational fragments that interweave in an obscure network of authors and readers that constitutes the expression of the collaborative knowledge construction in a community of interests, aims and shared experiences.

The dynamics of the interaction processes which take place in the authors and readers network suggests a diversity of forms through which learning can happen in a community. Though, and according to Wilson et al., (1998), the learning community activity tends to produce an interaction pattern mutually sustained that defines the learning collaborative support in the Web communities. The following aspects, proposed by Sherry & Wilson (1997: 72), characterise this collaborative model: *i) articulate the learning need; ii) seek help in a group forum; iii) engage in a help consultation; iv) assess learning; v) share the solution with the group; vi) archive the interaction or restated solution for future reference; vii) repeat this process, or any part, if necessary to support learning.*

The collaborative learning in the Web stresses the mutual engagement, the sharing of information and multiple perspectives, and the joined knowledge building activity in the networked communication practices among the community members.

The creation of a favourable environment to the involvement of all the members in the community activities implies, in the participatory processes of search and help consultation, a form of immersion in the knowledge representations amongst its members. Knowledge sharing through the electronic mail, the audio and video conference, the discussion group and the forum promote the progressive involvement of the community members in the process of negotiation of knowledge representations, a continuous readjustment of the models, an understanding of the knowledge complexity and still the development of the critical thinking through the shared experience. Besides, the networked communication on the Web transforms itself in a expansion of the cognitive capacities of the students.

It is in this sense that McLellan (1997) approaches the importance of the cooperative and sharing processes in the networked communication and learning, according to the collaborative model of Schrage. This model is

based on the participatory principle that exists in the construction of the shared experience that describes a dynamic and active process, like the one that happens in the presential conversation, or in the on-line conference, being the *experience* the context of production and knowledge dynamic renewal. In opposition, the sharing of an experience or event acquires a passive nature closer to the information reception phenomena.

The sharing principle is fundamental to the formation of the networked interrelated ideas, strategies and theories, the ones that Romiszowski (1997) refers are essential to the process of critical analysis, knowledge assessment and the new knowledge creative synthesis.

## 7. CONCLUSION

Learning in the Web learning communities is based on the networked interaction and communication and on the collaborative processes in the experience and knowledge building. The organisational bond of learning communities develops itself in the relationship with the knowledge through the collective and strongly interactive communication, among the individuals and between these and the distributed representation systems. The collaborative aspects are characterised by the mutual involvement in the community activities, in the knowledge sharing among its members and in the joint participation in the learning construction.

The community's members develop networks of flexible and collaborative knowledge construction, based on an active learner model, led to the promotion of the individual initiative and autonomy in the exploration of the representational multidimensionality of the distributed knowledge; so, it is an activity model that it is drawn from the individual to the cooperative, through the mutual engagement of the community members in the process of the knowledge building and the sharing of multiple perspectives of thinking. The activity of the learning community is a support for the amplification of individual cognitive capacities, as those of the group, in the development of the creative processes, in the critical thinking and in the collaborative work.

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