NEW STEPS IN THE ORGANISATION OF THE SCHOOL ACTIVITY IN THE FRENCH SECONDARY SCHOOLS: THE CHANGING ROLE OF PHYSICS TEACHERS

Michail Kalogiannakis

ABSTRACT

Since the introduction in 2000 of the Personal Guided Projects (TPEs in French) for students, which are a new educational form of learning in the French secondary school, the role of physics teachers has changed. The aim of TPEs is for students to organise a portfolio on relatively broad issues usually not taught in a traditional physics course, such as the greenhouse effect or wind energy. New teaching strategies are emerging and as a result physics teachers are adapting and developing new class skills, and new models of teaching. This paper aims to investigate the new roles that some French physics teachers are developing in class when they use ICT in their practice giving a stable theoretical background for analysing virtual communities of teachers. Our study is based on a content analysis of emails exchanged between physics teachers through two mailing lists. In our study, we consider the TPE-TICE and the PHYSCHIM mailing lists of the French Ministry of Education as a computer social network connecting teachers facing the introduction of two innovations (TPEs and ICT) in their classrooms. French physics teachers exchange and share ideas and material with their colleagues through these two lists which are then used as collaborative work tools for interaction and dialogue and as a way of sharing and discussing their new experiences. These two networks can be characterised as pedagogical networks playing a vital role in the diffusion of innovations. The content analysis of exchanged emails gives a glimpse of the way teachers are considering that their role is changing in class.

INTRODUCTION

ICT is not only bringing changes to the world we live in, but is also transforming the ways in which we learn, providing new potential for interaction and dialogue. New possibilities for teaching and learning are created and new learning environments are emerging with ICT use. The Internet has given rise to new research fields and has diversified existing research fields connected with human activities, including computer-mediated communication (CMC) and virtual communities. Computers are being used, in effect, to manage networks of relationships between people, changing the costs and benefits of co-operation.

In an interactional mode of communication, all participants have equal access to the communication space and research concerning such communication can be construed as research on the relationship between a speaker and an audience (Jackson, 1997). Scientific information is being created and transferred in new ways. Generally speaking, an important question is to study the process of understanding how new communication technologies affect the creation of scientific knowledge. The computer as a new communication technology opens a space for scholars to rethink assumptions and categories, and perhaps even to find new insights into traditional communication technologies (Morris and Ogan, 1996). CMC systems is a new form of social interaction, which encourages wider participation.

Virtual communities, (initially labelled as "virtual" in order to stress the absence of face to face physical presence) are nevertheless real communities. These communities are established either on the basis of asynchronous email message exchange or on a synchronous presence in text-based virtual environments The message exchange process on the Internet is almost instantaneous. The effect is a written correspondence that is similar to a conversation. Teachers have figured out where the Internet fits into their curriculum, how it can help them construct new visions for literacy and learning, and how they can share this knowledge with other educators and students (Karchmer, 2000).

Our research covers some French physics teachers in secondary school and provides information on the nature of changes taking place in teaching physics. This article intends to provide some background suggestions for the study of social worlds built by people on computer networks. Virtual communities have lately become a fashionable term, which will be used here in order to indicate the roles of physics teachers developed on-line through two mailing lists.

THE INTRODUCTION OF TPEs

On-line resources offer new possibilities and challenges to teachers. With the explosion of information available on the Internet over the last few years, teachers can no longer filter what students read. Students must be taught how to evaluate information while they are in the process of acquiring it (Sosin, 1999). Many teachers today are envisioning novel ways of integrating the Internet into their daily lessons (Karchmer, 2000) by using mailing lists and/or creating Web sites (Audran, 2002).

There is currently great debate in the French educational system about a new educational form of learning called TPEs ("Travaux Personnels Encadrés" in French), which means Personal Guided Projects. TPEs were introduced in all French secondary schools in the eleventh grade during the first quarter of 2000-2001 and the year after in the twelfth grade. For a given class, at least two teachers of different subject matters offer the student a choice of issues to be treated out of a national list. According to this new approach, students should work in small groups, choose a topic, conduct documentary research and then write a report that will be presented publicly. It is important to base the TPEs on ICT research. The physics teachers concerned must also develop new skills in ICT.

SCHOLARLY MAILING LISTS

We are spending more and more of our time communicating via computers and through technologies. Email and CMC allow interaction on a larger scale than was previously possible via face to face communication. Mailing lists provide a new way of sharing and discussing these new experiences. Users of mailing lists often feel that they are part of a social gathering or in some cases a community (Jones and Rafaeli, 1999). Through email exchange, which is different from face to face communication, teachers build and maintain their social networks. Generally speaking, a scholarly mailing list offers a new and attractive way for semiotic interfacing between education actors in a virtual environment (Rojo, Ragsdale, 1997).

In order to define these new forms of social interactions such as mailing lists, Steven Jones uses the term "cybersociety" (Jones, 1995). The term cybersociety concerns the connections that are supported in the Internet by the use of new technologies. In France mailing lists are described as tools for co-operative work between teachers and as exchange tools used by a quite a sizeable number of teachers. These media respond to a demand for information which until recently has not been taken into account. Participation in the mailing list is very unequal, almost the work of an active minority of teachers (Drot-Delange, 2001).

Internet communities have two specific characteristics : firstly, they crystallise around a specific set of texts and secondly, people in the community share a set of common discursive and signifying practices (Mitra, 1999). Specifically, on-line forums provide (i) freedom from time constraints, participants can

participate if and when they choose ; (ii) time for reflection (participants decide when and if they choose to participate) and (iii) opportunities to research and back up assertions. Like face to face communication, CMC enables high interactivity, which then leads to sociability. Interactivity is the condition of communication in which simultaneous and continuous exchanges occur, and these exchanges carry a social, binding force (Rafaeli and Sudweeks, 1998).

For Sudweeks and Simmof (1998) traditional methodologies need to be adapted to new research environments like CMC as the human is the central object, participant, information generator, and collector. They also argue that in Internet research, the issue is the distinction between information and knowledge. They wonder if any experience on the Internet creates new knowledge or just a transformation of existing knowledge into a new form. CMC is neither a mass media as we have grown to know it, nor interpersonal face to face. After all, group "members" are not really members in any officially sanctioned way. Are they ever really there ? There is no "there" to be at. There is no "when" to be on (Rafaeli and Sudweeks, 1998).

Mailing lists have a very good chance of being adopted as an effective and functional means of consultation and collaborative work with professionals (Anderson and Kanuka, 1997) allowing individuals with common interests to find and interact with each other. Each communication environment requires specific knowledge. In a face to face environment, we learn at a very early age not only the phonetics and grammar of the language but also the management of taking turns in conversations. In written communication, we add knowledge of orthography and a more formal use of language. To communicate using email, the user needs to know enough of the operating system to launch the application; to compose, reply, and send a message; and to quit the application. Discussion lists often generate hundreds of messages a day, and contributing to a conversation means responding immediately before the topic shifts and the sequence is lost (Sudweeks and Simoff, 1998).

Faced with the introduction of the TPEs, French physics teachers have had to update their knowledge in order to guide their students and to develop new roles (Lautier, 2001). The French Ministry of Education created the list PHYSHIM[1] in November 1999 and the list[2], TPE-TICE[3] in March 2000. These two lists are moderated, which means that messages are first sent to a moderator for approval before being available to all list's members. The public archives are available by topic or in chronological order. French physics teachers using these two lists share the same interest: the introduction of the TPEs in their class practice and the teaching of physics. By using the TPE-TICE and PHYSCHIM lists they can pool resources with colleagues who have similar questions and concerns.

METHODOLOGY

In order to put the new roles of physics teachers into context, we shall offer a case study of an actual ICT based learning environment like the THE-TICE and PHYSCHIM lists. These lists can be perceived as a valued platform for continuing professional education for teachers. The PHYSCHIM and TPE-TICE lists archives are also a rich source of exchanges between French physics teachers. These two lists are good examples of how contributors, each one from his own perspective, may contribute as well as benefit from others' contributions.

This paper presents a first content analysis of emails exchanged in these two mailing lists of the French Ministry of Education. The discussion in the PHYSCHIM list has been studied for a period of 26 months. There are archives reaching back to November 1999 when the list was created. In terms of numbers of messages from the creation of the list in November 1999, to December 2001, 3023 messages were posted by the 650 subscribers to the list.

---

[1] http://listes.educnet.education.fr/wws/info/physchim
[2] http://listes.educnet.education.fr/wws/info/tpe-tice
[3] TICE is the French acronym for Educational ICT.

The discussion list TPE-TICE has been studied over a period of 22 months. From March 2000, when the list was set-up to December 2001, 2260 messages were posted by teachers of all disciplines. For our research, 347 physics teachers' messages were selected and analysed on the basis of a content analysis from the PHYSHIM list and 120 physics teachers' messages were selected and analysed from the list TPE-TICE. These messages provide important elements about the roles of teachers (Miles and Huberman, 2003). The average month contained about 102 emails for the list TPE-TICE and 116 messages for the list PHYSCHIM posted by teachers of all disciplines.

We can consider various units of analysis : the single message, the thread[4], the group, and the network within which the group resided. For our research we analysed only the single message posted by physics teachers because in the thread of messages a lot of emails were posted by teachers of other disciplines. Using ICT effectively, requires a radical transformation of practice in the classroom. In these two lists, most of the time the end of the messages is demarcated by a sign-off presenting name and professional affiliation of the sender. However, it is entirely possible to send messages without signing them. This category of messages, was not taken into consideration.

THE CASE OF THE TPE-TICE AND PHYSCHIM MAILING LISTS

Many participants think that lists are going to be an important avenue in the future for sharing information and practices. Sometimes it is the on-line interaction itself that makes teachers contribute messages. List contributions can be summarised by the following points : (i) these two lists offer more freedom to teachers as the information exchange is rapid and effective. (ii) These two lists give teachers an opportunity to express their views. (iii) The lists PHYSCHIM and TPE-TICE allow teachers who are far from the centre to feel less isolated. (iv) These two lists encourage teamwork by pooling the teachers' knowledge and experience.

Having observed this new form of communication through these two lists, it is possible to distinguish between participants who are *lurkers* and those who are *contributors*. Lurkers are the members of a list who do not engage in public discourse. For Smith, a reason why individuals may *ride free* is the belief that the efforts of others will suffice (Smith, 1992) and as the group becomes larger, free riding is spread over a greater number of people.

The few empirical studies that have explored the relationship between user-contributions and user-populations in computer mediated group discussions, have found that a small minority of participants post a large proportion of messages (Rojo and Ragsdale, 1997). A public good is a resource from which all may benefit, regardless of whether they have participated in the creation of the resource in question. The temptation is to enjoy a public good without contributing to its production, however if a majority of people refrain from participating, the good is never created and everyone suffers. If all participants choose to free-ride, the collective benefit will not be produced (Kollock and Smith 1996).

Almost all regular users of the Internet have at times experienced what is commonly referred to as "information overload", the sensation of being swamped by unwanted information. It can be argued that humans can think about almost everything, but they cannot deal with everything at once. An important factor related to teachers dropping out of lists is the threat of information overload, time investment and the relevance of the content (Jones and Rafaeli, 1999). They usually leave the list when too many messages are exchanged and/or if they find too much irrelevant information. The problem of relevance in academic mailing lists is difficult to solve because what one person considers irrelevant, may be relevant for another (Rojo, 1995).

It is interesting to mention the approach suggested by Porter which argues that a critical reading of the discourse of a community, such as the emails of a list, may be the best way to understand it (Porter, 1986). Another important element is that mailing lists can reduce the costs of communication and co-

---

[4] Thread is a chain of interrelated messages.

ordination, in some cases allowing groups to produce and maintain collective goods that would otherwise be too expensive. The challenge of finding teachers with similar interests is greatly reduced; the usual problems of meeting in a common time and place are eliminated (Kollock and Smith 1996).

Our research deals with the new roles of physics teachers following the introduction of TPE and ICT use through the TPE-TICE and PHYSCHIM lists. Previous research has shown that some French physics teachers present multimedia by evoking mainly Internet as a type of continuing teacher training. They have developed a new image of their job, a new relationship with the knowledge they must impart and a new way of teaching with less interventions (Kalogiannakis & Caillot, 2001). For these authors, the traditional role of the teacher as a dominant and unique source of knowledge has been questioned.

A FIRST ANALYSIS OF THE EMAILS

First, the messages were reviewed in order to identify and organise major categories that emanate from data. Two dimensions were identified : (i) communicating on TPEs topics through discussions on their links with physics lectures and (ii) stimulating the interlocutors' responsiveness. Messages were reviewed again to identify the types of content communication.

Most of the messages in the lists TPE-TICE and PHYSCHIM contain statements of facts. More than a quarter of the messages contain a question or request providing information, probably in response to the messages that were predominantly requests for information. And more than a third of the messages contain personal content, in the form of a verbal self-disclosure, an admission or introduction. Most of the messages use first-person plural pronouns. Messages are more likely to contain agreement than disagreement. Newsgroups often contain requests for information, replies to requests, discussions of the validity and accuracy of replies, and further questions prompted by the discussion (Kollock and Smith 1996).

On the whole, 100 different authors in the list PHYSCHIM and 31 authors in the list TPE-TICE contributed messages to the corpora content analysed here. The most frequent contributor is responsible for 25 messages in the list TPE-TICE and 16 messages posted in the list PHYSCHIM by another physics teacher. However, other frequent contributors had about 5 messages in both lists. Authors who appear in the sample only once or twice wrote more than two thirds of the sample of messages. The figure 1 presents a first content analysis of the topics of the lists TPE-TICE and PHYSCHIM.
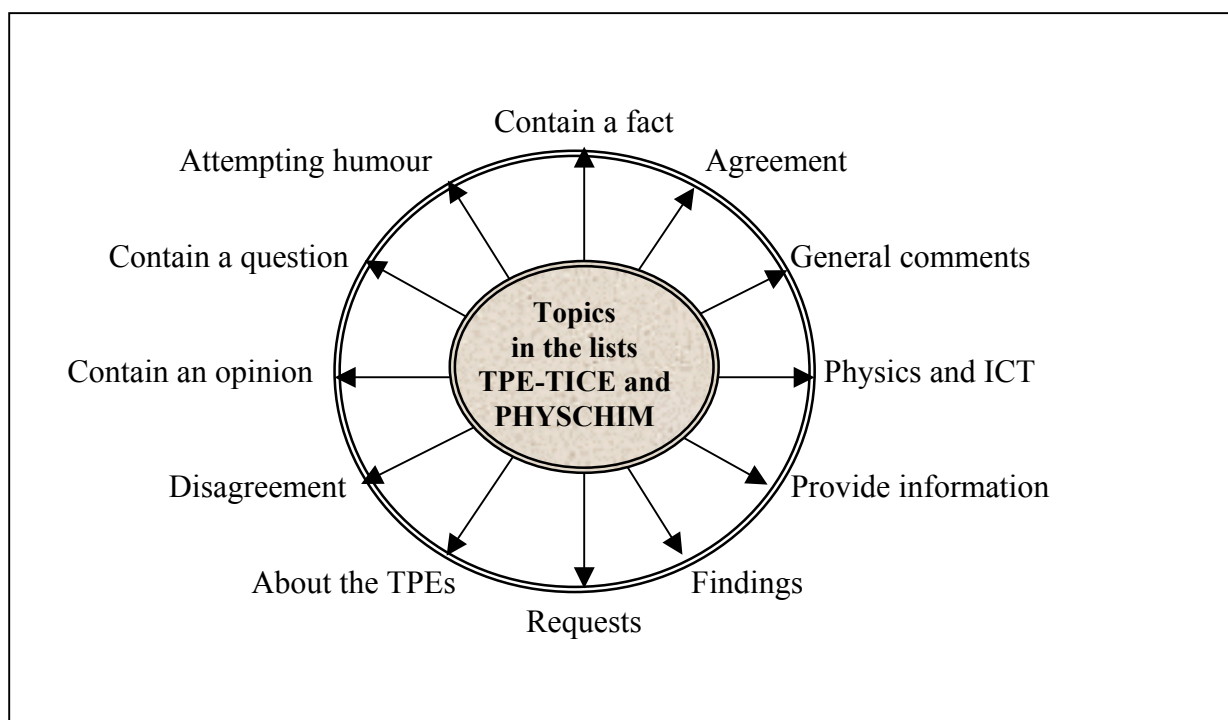
Figure 1. The topics of the lists TPE-TICE and PHYSHIM

THE NEW ROLE OF FRENCH PHYSICS TEACHERS

Teachers are questioning their traditional role as the dominant source of knowledge in the classroom. With ICT, scientific knowledge is no longer on the teacher's side, but it is now shared between different sources such as the Internet. Physics teachers often seem to be "less present" in class. After the introduction of the TPEs, the traditional educational role seems to be declining gradually. Furthermore, ICT applications are also characterised by teachers as effective educational tools for explaining physics and chemistry concepts.

Teachers argued that they also work with ICT to simulate experiments, which in the past could not be carried out. Thus, the computer, which used to be a simple calculator has been transformed into a tool which promotes a new vision of the world of physical science teaching. The real problem raised by teachers is how to integrate and generalise the use of ICT in class practice, how to manage the transition from a rather traditional pedagogy to teaching based on project pedagogy like the TPEs where the student conduct research on the Internet by themselves.

As French physics teachers learn to live with ICT, they often take on a role frequently compared to that of a "stage side prompter". A lot of messages in the TPE-TICE and PHYSCHIM lists show teachers to be "managers of learning". New demands of autonomy are often made with the introduction of TPEs in the French educational system. French physics teachers see themselves as students' "guides" and "coaches". Following the introduction of TPEs, some feel they are becoming their students' "facilitators" and "supporters". However, this does not necessarily mean that educators perceive the Internet as a replacement for traditional texts, but they consider it to be an additional resource for students to use. Figure 2 addresses the different roles of the physics teachers, which emanate from the first analysis of the messages in TPE-TICE and PHYSCHIM lists.
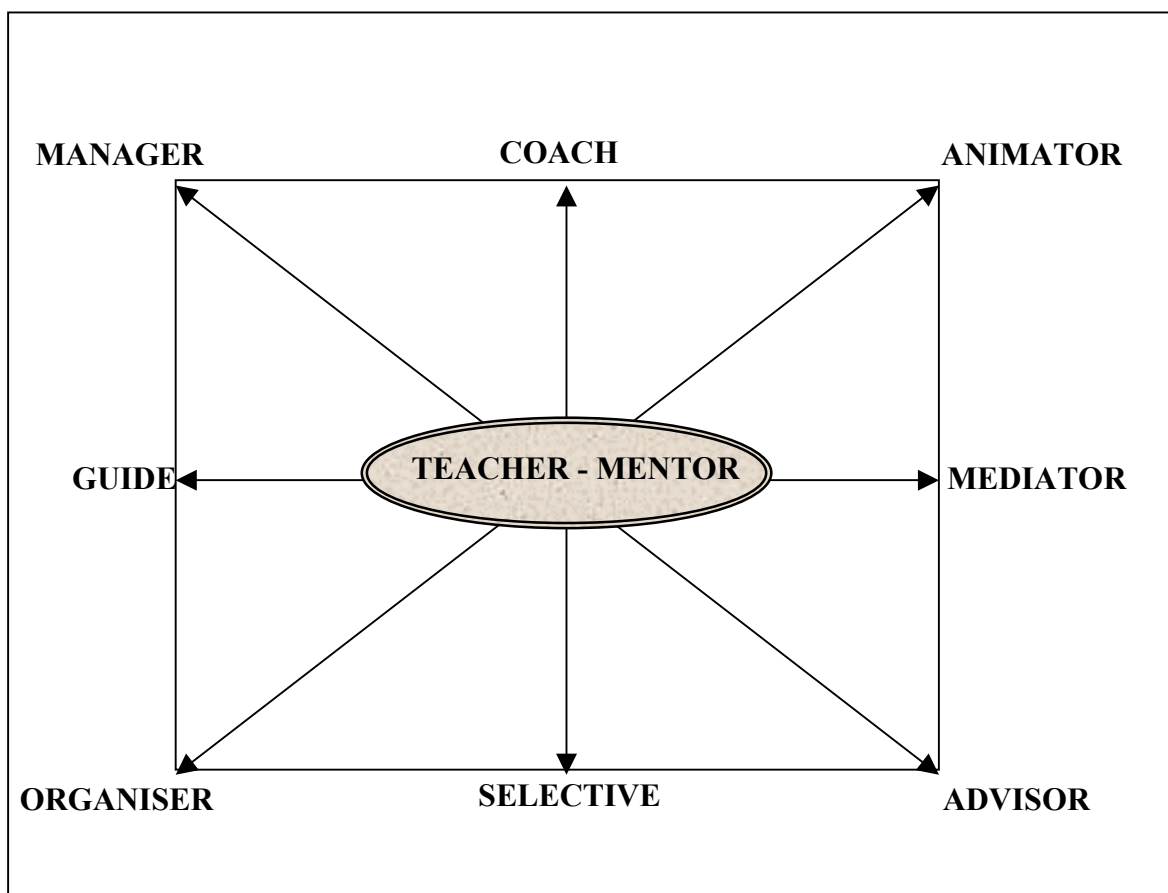
Figure 2. The new roles of the French physics teachers

One of their primary roles is to help students determine a research topic for the TPEs. Following the introduction of the TPEs they feel that they have become "mediators" and "mentors" for their students. However, in spite of their general enthusiasm, teachers also reported that they encountered technical problems in the use of ICT class. Physics teachers also consider ICT as tools for enriching their own knowledge and for carrying out the research required by their every day teaching. Furthermore, the teachers consider that ICT facilitates communication, and contributes to the progress of educational practices by connecting school to the outside world. The improvement in communication is considered to be essential in the daily didactic process.

CONCLUSIONS AND IMPLICATIONS

Generally speaking, important questions have been raised about the new roles assumed by physics teachers when they introduce ICT in their classes. Through the exchanged emails we have seen that our sample of French physics teachers are quite different from "traditional" physics teachers. They have developed a new relationship with the knowledge they must impart and a new image of their job. They have also introduced a new way of teaching with fewer interventions on their part and more responsibility on the students' part. The introduction of the TPEs has highlighted the main interest of this new form of learning. The actual number of exchanged emails[5] shows that teachers are still very interested in the TPE-TICE and PHYSCHIM lists.

---

[5] 205 emails were posted in the list PHYSCHIM in February 2003 and at the same time 57 messages were posted in the list TPE-TICE, after almost three years of the introduction of the TPEs in the secondary schools in France.

Despite the ambitions of these net contributors to create a new form of scientific communication, there are studies arguing that CMC will not replace traditional face to face interaction (Lewenstein, 1995). Additional research and interviews with physics contributors to these two lists will finally complete this research. We can also assume that through scholarly electronic forums these kinds of communities will have a major and notable impact on the scholarly community in the future.

REFERENCES[6]

Anderson, T. and Kanuka, H., (1997). On-line forums: new platforms for professional development and group collaboration, Journal of Computer-Mediated Communication, 3(3). [Paper available online at : http://jcmc.huji.ac.il/vol3/issue3/anderson.html]

Audran, J., (2002). La liste de diffusion, un instrument de formation professionnelle? Recherche et Formation, 39, 123-141.
[Paper available online at: http://www.jacques.audran.net/articles/index.htm]

Drot-Delange, B., (2001). Teachers and electronic communication: a minority activity ? Educational Media International, 38(2/3), 141-148.

Jackson, M.-H., (1997). Assessing the structure of communication on the World Wide Web, Journal of Computer-Mediated Communication, 3(1).
[Paper available online at: http://www.ascusc.org/jcmc/vol3/issue1/jackson.html]

Jones, Q., (1995). Cybersociety: Computer-mediated communication and community, 10-35 in Jones, Q. (Ed), Understanding Community in the Information Age, Thousand Oaks: Sage Publications.

Jones, Q. and Rafaeli, S., (1999). User Population and User Contributions to Virtual Publics: A Systems Model, 239-248 in Proceedings of the ACM International Conference on Supporting Group Work (Group99), Phoenix-Arizona : ACM Press.

Kalogiannakis, M. and Caillot, M., (2001). New roles and new social representations of French physical science teachers using multimedia, 459-461 in Psillos, D., Kariotoglou, P., Tselfes, V., Bisdikian, G., Fassoulopoulos, G., Hatzikraniotis, E., and Kallery, M. (Eds), Proceedings of the Third International Conference on Science Education Research in the Knowledge Based Society, 2, Thessaloniki: ESERA.

Karchmer, R., (2000). Understanding teachers' perspectives of Internet use in the classroom: implications for teacher education and staff development, Reading and Writing Quarterly, 16(1), 81-85.

Kollock, P. and Smith, M., (1996). Managing the virtual commons: cooperation and conflict in computer communities, 109-128 in Herring, S., (ed.), Computer-Mediated Communication : Linguistic, Social and Cross-Cultural Perspectives, Amsterdam : Benjamins.
[Paper available online at : http://www.sscnet.ucla.edu/soc/faculty/kollock/papers/vcommons.htm]

Lautier, N., (2001). Psychologie de l'éducation - Regard sur les situations d'enseignement, Paris: Armand Colin.

Lewenstein, B., (1995). Do public Electronic Bulletin Boards Help Create Scientific Knowledge? Sciences, Technology & Human Values, 20(2), 123-149.

Miles, M. and Huberman, M., (2003). Analyse des données qualitatives, Paris - Bruxelles: De Boeck.

---

[6] Links presented in the references retrieved the 01/04/2003.

Mitra, A., (1999). Characteristics of the WWW Text: Tracing Discursive Strategies, Journal of Computer-Mediated Communication, 5(1).
[Paper available online at : http://www.ascusc.org/jcmc/vol5/issue1/mitra.html]

Morris, M. and Ogan, C., (1996). The Internet as mass medium, Journal of Computer Mediated Communication, 1(4).
[Paper available online at : http://www.ascusc.org/jcmc/vol1/issue4/morris.html]

Porter, J. E., (1986). Intertextuality and discourse community, Rhetoric Review, 5, 34-47.

Rafaeli, S. and Sudweeks, F., (1998). Interactivity on the Nets, 173-190 in Sudweeks, F., McLaughlin, M. and Rafaeli, S. (eds.), Network and Netplay: Virtual groups on the Internet, Massachusetts : MIT Press.
[Paper available online at : http://www.it.murdoch.edu.au/~sudweeks/papers/netint.pdf]

Rojo, A., (1995). Participation in scholarly electronic forums, PhD thesis, Canada: University of Toronto.

Rojo, A. and Ragsdale, R. G., (1997). A process perspective on participation on scholarly electronics forums, Science Communication, 18(4), 320-341.

Smith, M., (1992). Voices from the Well: The logic of the virtual commons. Masters thesis, Los Angeles : University of U.C.L.A.
[Paper available online at : http://www.sscnet.ucla.edu/soc/csoc/papers/voices/Voices.htm]

Sosin, K., (1999). Explorations on Using the Web for Teaching - Introduction: How Might On-Line Networks Change Teaching? Feminist Economist, 5(1), 79-82.

Sudweeks, F. and Simoff, S., (1998). Complementary Explorative Data Analysis: The Reconciliation of Quantitative and Qualitative Principles, 29-56 in Jones, S., (ed.), Doing Internet Research. Thousand Oaks : Sage Publications.
[Paper available online at: http://www.it.murdoch.edu.au/~sudweeks/papers/ceda.pdf]

Michail Kalogiannakis
University Paris 5 - René Descartes
Education & Apprentissages (EA 3626)
45, rue des Saints Pères
75270 Paris Cedex 06
FRANCE
E-mail: mkalogian@noos.fr, mkalogian@hotmail.com