EDUCATIONAL MEDIATED COMMUNICATION, DISTANCE
LEARNING, AND COMMUNICATION TECHNOLOGY:
A POSITION PAPER

Dr. Daniel Peraya
Education Technologies Unit (TECFA)
University of Geneva, Switzerland

PART II

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Let’s study for now a double process, namely of content mediatisation
on one hand and, on the other, of relational mediation. It is a co-occurrence
of the spatial-temporal split bound to distance teaching and consequently
to the fundamental de-synchronisation taking place between teaching
activities and learning processes. We should be even more radical in
our formulation and emphasise that both mediatisation modes are the
core of distance pedagogic communication procedures and environment.

Contents: Mediation

The notion of mediated communication contains an implicit reference
to two other concepts allowing one to capture and understand previous
disparities in interpretation. Let’s define them:

- the medium, this obligatory go-between and intermediary agent
  in the communication binding the teacher and his students: It
  always deals with printed documents, pictures, illustrations,
  etc., with material representations, in short. We can therefore
  not speak of mediatised communication without referring to,
  on one hand, the symbolic and cognitive theories of the
  psychology of representation and, on the other, to the functional
  theories of signification and meaning in signs and symbols
  (semiotics);

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Media as mass media communication: This almost spontaneous interpretation is understandable since, since very early on, distance education has drawn on mass media, especially the telephone, radio and television, to reach distant or geographically dispersed learners.

Research on various pedagogic media taxonomies have shown that the term media, as is the case with the word technology, remains poorly defined and subjected to various conflicting interpretations. Most definitions often designate very different realities, even contradictory ones: they indiscriminately refer to language, message type, reception channels, broadcasting system, etc. (Heidt, 1981; Sauve, 1994). Therefore, in order to better circumscribe what mediatization is, it seems essential to describe what information and knowledge representations are - in the symbolic and semiotic sense - in order to distinguish them from all other aspects concerning media, such as broadcasting, delivery, reception sites and channels.

Symbolic representations can be defined by usual terms based on the various languages we use to communicate our experiences, our knowledge and general data: written or spoken language, graphic representations, iconic and photographic cues, etc., which all deal with various semiotic and symbolic forms. To clarify this notion, we could refer to a well-known example taken from Glass and Holoka, quoted in Dents (1989). The drawing of a cup can be represented by its verbal definition or by a more or less complex mathematical expression: the cup can be described by an elliptic paraboloidal equation and the saucer by a circle equation. As far as we are concerned, we would gladly add that the drawing of the cup already constitutes an analogue representation of the object, the cup itself. With these definitions in hand, we have three different representation of the 'object cup' available: a drawing, a verbal definition and mathematical equations.

With broadcasting and delivery of data and knowledge, on the contrary, we deal with transmission channels and technical/material devices used
by the recipient to take over the message. Finally, the reception environment can be understood in view of the following four different points of view: physical, material, institutional and socio-cultural. The distinction between media and representation we are presenting here is not new. In 1969 already, authors like Tosti and Ball (quoted in Heldt 1981) asserted that the main learning factor was not the medium itself but rather the way knowledge is arranged and delivered.

### Table 1: Analysis of media according to fixed criteria

<table>
<thead>
<tr>
<th>Channels:</th>
<th>physical and/or technical vectors of transmission and broadcast: air conduction, radio waves, wire technology, etc. as well as additional device for encoding/decoding. Note that the channel can determine actual material reception conditions as is the case for subdued light required for movie projections.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage devices:</td>
<td>material device for information storage: magnetic tape, optical disk, floppies, hard disks, etc.</td>
</tr>
<tr>
<td>Screening devices:</td>
<td>material device used to become aware of the actual representation: paper technology, projection screens, computer monitors, etc. A technical object allowing a strict restitution, the so-called 'display function'.</td>
</tr>
<tr>
<td>Reception environment:</td>
<td>the social interaction scene, the material, human, institutional and socio-cultural frame of reference.</td>
</tr>
<tr>
<td>Types of representation:</td>
<td>kinds of representation, 'languages', whether through arbitrary signs (verbal language, mathematical formula) or through various analogue signs and signals rooted in a resemblance relation with the object (photographs, graphics, schemata, etc.)</td>
</tr>
</tbody>
</table>
Let us take an example to further explain these distinctions. The photographic representation of an animal, like a dromedary, may be shown as a photography, printed on positive paper, or may be shown on screen through a film, a positive transparency, or may even be digitally scanned and displayed on a computer monitor. In all three cases, the representation, the symbolic form, is identical; while the medium is very different indeed. As representations, all three instances show a photographic image, with its distinctive traits. As a semiotic form, a photography is an 'icon', distinct from a verbal representation using words, i.e. a representation that strongly resembles what it represents. The photo of this dromedary resembles an animal that I know through its rendering on a famous cigarette packet, Camel, through my childhood circus memories, through my trips in Africa, etc. This material representation is well in accordance with the prototype image I extract from my various previous former experiences. It may therefore appear to be similar to the animal itself. What distinguishes the three cases at hand is that the actual presentation means and the conditions of perception and/or reception of the message are completely different. In the first case, the image is meant to be ready by an individual. In the second case, it is watched collectively, in subdued light. In the third case, we have an object that can be treated in many ways, possible only with digital computerised graphic material.

Consequently, we ought to modulate Tosti's and Ball's thesis since we today know that photography, as we have described it above, undergoes a process of deciphering by the viewer in which his apprehension and interpretation changes with medium used and in relation with the conditions of reception. These conditions play an essential role together with the influence of the channel on viewing. Hence, understanding a message means to account for all these elements: is a given film seen on TV or watched in the local theatre really the same film? It is clearly in the light of this kind of observation that the well-known Mac Luhan motto is to be understood: "The medium is the message" (1967).
Relational Mediatisation

Speaking about a mediatisation educational relationship, naturally evokes the concept of interactivity. This idea is not strictly bound to the field of computer assisted instruction (CAI) even if, for most teachers, it is chiefly associated with this particular context. It also refers to a number of computer-based applications such as, to name a few, interactive software, interactive scenarios, interactive video disk technology (CD-I), interactive image generation and processing, interactive information terminals in museums and public transport.

As was the case for concepts like media and technologies, interactivity is not an easily defined term. It is closely related to the idea of interaction, in the way this concept has been investigated in the frame of social anthropology studies on interaction (see mainly Goffman, Watzlawick and Weakland). It is also bound to the notions of inter-relation, or of verbal interactions studied by linguistics and pragmatics. Consequently, it is included in a heterogeneous semantic web of contrasting notions:

- active vs. passive;
- unidirectional vs. multi-directional;
- exchange, dialogue, conversation vs. passive reception (Rebate, Lauratre, 1985).

According to these authors, interactivity has the following distinctive features:

**Table 2: Interactivity, a definition**

<table>
<thead>
<tr>
<th>Dialogue</th>
<th>between</th>
<th>human speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>between</td>
<td>human speakers and machines</td>
</tr>
<tr>
<td>Exchanging</td>
<td>between</td>
<td>subscriber and network nodes</td>
</tr>
<tr>
<td>Messages</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Ability to act | on | the software |
| Interference   | with | the contents |
Since this definition has a high degree of extensiveness, it can take account extreme situations from the social bond constitutive of interactivity, on one hand, to the mere exchange of information between machines, on the other. According to Sansot, interactivity seems to designate "...rather an instrumental relationship between humans and machines under control of a request for information" (1985:87). In this perspective, interactivity is bound to the field of human-to-machine interactions, leaving the characterisation of human-to-human relationships between speakers in the realm of inter-relations. This classification is reminiscent of the distinctions made between two forms of interactivity and stands very much at the core of relational mediation procedures such as functional interactivity and intentional interactivity (Barchechat et Pouts-Lejus, 1990). Other authors describe the same kind of distinctions with, respectively, the qualifiers of transitive and intransitive interactivity (Chateau, 1990; Jacquinot, 1993-b.)

Let's first elucidate functional interactivity. The category encompasses the interactions between a machine and its user. Said in more technical terms, this kind of interactivity manages the human-to-machine interface. It describes how far the learner may interact with a machine and its software. Those of you who are familiar with computer software or with arcade games very well know that the degree of liberty allowed to the user as well as the possibilities offered by any given software vary quite a lot. By analogy, this kind of interactivity has been applied and extended to a variety of situations present in CAI. From our point of view, a printed document or a television broadcast present a very small component of functional interactivity. How can it manifest itself? What is meant here as interactivity includes the various clues that help the learner during his browsing of a given document and depletes the tools that may assist him in managing and constructing his scrutiny of mediated documents. It becomes thus apparent that for a written text or a printed document an important constituent of functional interactivity lies in page layout and typesetting properties - Netchine-Grynberg's "mise en page" - as well as in the visualisation of a text's conceptual structures through scripto-visual attributes such as text formalisation.
and typographic arrangement - Netchine-Grynberg's "mise en texte" or "textual" layout - (Netchine-Grynberg, Netchine, 1991).

A second category of interactivity is what we just called intentional interactivity. We are dealing here with communication taking place between an author and his public. It seeks to describe the re-construction of a dialogue situation between a physically absent author who however manifests his presence by the imprint he left on the software utilised and his interlocutor. Said otherwise, intentional interactivity is made up of a simulated dialogue within an interactive communication situation: without it, off-line communication would seem completely anonymous and disembodied. Of course, we are here not dealing with a real dialogue, since a distance course situation is a unidirectional communication setting: the recipients can't answer the emitter. Still, the imprint left by the author, the way he catches the attention of the recipient, how he addresses and involves him, all these features represent an essential way of formalising the mediated relation. A last remark: in this very case, the term of interaction is better suited than interactivity, because this term clearly evokes the dialogue and relational dimensions of an interactive situation. By developing the so-called conative functions of a discourse (the term applies to the effect-causing features of a linguistic utterance on the listener) as well as by unfolding the expressive and phatic (by the setting up of a communication channel) properties of communication, a situation of genuine intercommunication is de facto restored (Jackobson, 1963).

With these point in mind, television and video programs may seem less interactive than the computer when considered at a functional level. TV broadcasts and video programs may however be more interactive than some computer software packages, when seen as items of intentional interactivity. Indeed, TV can be pretty involving for the learner if the sensory, affective and intellectual activities developed by the recipient to interpret the message received are taken into account. Intentional interactivity can originate in the constructive recognition the receiver has to perform in order to acknowledge fully the particular
context-setting at work in TV programs: a process standing at the very core of the sender/recipient duality (Mcunar, Peraya, 1993). On the other hand, a number of computer software packages display very little intentional interactivity, even if, studied from a functional point of view, they may appear to be functioning satisfactorily.

Finally, one may find kinds of interaction pretty close to situations of face-to-face communication thanks to various technologies of distance or 'tele-presence' like audio and video conferencing. A number of research results have demonstrated that, in this case, the communication process is characterised by an important loss of information, principally of analogue and non-verbal kind such as gestures and glances which play a crucial role in social rituals like, for instance, those at work in giving the floor to someone during a face-to-face conference (Perrin et Gensolen, 1992).

Table 3: Forms of Interactivity

<table>
<thead>
<tr>
<th>Interrelation</th>
<th>Intentional Interactivity</th>
<th>Functional Interactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>H/H face-to-face</td>
<td>H/H at a distance</td>
<td>H/M face to face</td>
</tr>
<tr>
<td>Tele-presence</td>
<td>Dialogue setting</td>
<td>Manipulation</td>
</tr>
<tr>
<td></td>
<td>including the receiver; constructed relationships</td>
<td></td>
</tr>
</tbody>
</table>

(Note: H= Human; M= Machine)

**Distance Education and Communication Technologies**

To overcome distance was, from the beginning on, the primary aim of the first distance education institutions and hence the central importance of communication and broadcasting media in this type of training. After, of course, bringing into play the post office, which was its first vector, distance education took advantage of the telephone to soon make use of radio and television networks. Even now, to sometimes brand classical distance education institutions and public correspondence courses
institutes as "the conjunction of a school and a post office" is not to try to crack a joke: the Hagen Fern Universitat, for instance, has a postage expense budget equivalent to a DM 3 Million, to handle and meet the needs of some 50,000 students (Peraya, Haessig, 1992).

From a historical perspective, it is believed that the actual development of distance learning coincided with the invention of the postmark and the generalisation of cheap postal services (Henry, Kaye, 1989). The best illustration of this process are the correspondence courses proposed by Plemann as early as 1840, at the very moment when cheap postal services went into full effect. In a more general fashion, we may say that the development of distance learning is following the transformation of the ways information is being broadcast and exchanged. We should also add to these factors, progress made in printing technology and in the production of a cheap paper which allowed both to lower the costs and to rise significantly the quality of printed media. At the same time, this technological evolution has led to an in depth change of how we record, store and retrieve information (Curran, 1992).

It is therefore no surprise that distance learning goes now through a significant revival as telecommunications are growing fast and when digital telecommunications are in the process of completely overturning the way we record, use, broadcast and deliver information (Moles, 1988): utopian views like Mac Luhan and Emerec's global village and the so-called informational society do not seem to have much more to wait to become reality. The Information highways, the rise of the Internet and of the World Wide Web look like convincing steps towards this aim. Moreover, the impressive growth of distance learning during recent years seem to confirm this tendency: information technologies and distance learning and training are growing so as to sail hand in hand.

However, to analyse the role of technologies in the field of education and training is no easy task. The term technology itself has since long been subjected to many divergent interpretations. This confusion first happened within the field of technology, only to spread further when
the word was applied in the domain of education. Besides, and today more than ever, the multiplication of technical devices as well as the growth of services that claim to qualify as technological are trends that add to the confusion.

Still, let's try to expound what this term meant. Originally, technology means "the totality of the technological terms pertaining to a field or a science" - technical language, in short. It then was used to designate "a technical method of achieving a practical purpose" in a given profession or scientific activity (Webster, op.cit.). The expression technology of a specific field may thus be used to talk about the different technical methods used within this speciality. Additionally, the word also conveys the meaning of state of the art techniques, drawing on special resources and developing techniques.

In its present usage, the term seems to cover three main - and competing - meaning:

a. a scientific sense in so far as technologies always are positively connoted by the fact they belong to the field of state of the art research;

b. the sense of material as well as intellectual techniques, i.e. pertaining both to the tools used as well as to the design and development of technical products;

c. finally, specifying technical objects themselves, as a result of the aforesaid design and production processes.

Clarifying the subject in the field of education is not easier. We owe to Scholer (1983) a well documented study on the evolution of educational technologies, based on their basic concepts, their fields of application and describing the terminology associated with their use. The author quotes a number of research and particularly Davies' (1972) and observes that the term of technology is used in two very different meanings, one referring to a physical idea and the other referring to scientific concept. In the first case, the idea points to the application of engineering
procedures to devices used in the teaching process. In the second case, the idea is to apply "scientific principles to education [...], to apply the fruits of theory and research in behavioural sciences as well as those of any other pertinent knowledge to the art of teaching" (1983:29-30).

In an all-inclusive domain like education, we may perhaps discern to families of meaning. First, technology would be akin to problem solving procedures, to a work style, using scientific methodology to find solutions to a problem in the perspective of a particular task. In this case, the expression of technology or rather of learning and instructional technologies is being preferably used. In a second family of meanings, the referent would be about blending various devices and machines to teaching procedures, in order to enhance their efficiency. One then talks about technologies or rather about educational technologies.

When we superimpose blanket definitions in vogue in education with those misused in technology, we realise that it is not too easy to find our way in the different meanings of the word, as has been the state of affairs when we tried to define the word media above. To add to the confusion, general usage puts procedures, design, technical solutions, products and services in this very same category of technology!

**The Technological Mess: A Number of Empirical Objects**

Let us first mention an assortment of designations found in the literature:

- new information and communication technologies (NICIT)
- new training technologies (NTT)
- information and communication technologies (ICT)

All the above expressions are applied to innumerable technical devices, to the 'ironmongery' as Clutter puts it, and they are deemed appropriate for objects fulfilling very different functions such as: DBS television and high definition TV, interactive tele-conferencing using both sound and image, telematics, videotext, ISDN digital networks, different kinds of information up- and downloading systems, data browsing in a telematic
system like, to quote but one, the Minitel. In the field of image processing, the above labels are used to talk about the digital photographic camera, videodisks, CD-ROMs, CD-Worms, the CD-I and DVI, virtual worlds, etc. Following suit, each one of these technologies is exemplified in a particular sphere of activity. To quote a few: telecommunications (circulation, broadcasting and reception of information); scanning, processing and storing images; simulations and production of digital artefacts of all kinds, etc. In spite of all its fuzziness, the term has made a fortune in the market-place of specialised speech and is worth its weight in gold (Bourdieu, 1982).

However, specific typologies are to be found which propose a classification based on functional distinctions. We propose one below after Basinac, Wentland (1984):

1. **Techniques**
   1.1 computer techniques
   
   micro-computers; data scanning, digital data compresson
   1.2 telecommunications
   
   phone lines and modems, telex/teletext networks, digital networks

2. **Hardware**
   
   2.1 storage appliance (devices)
   
   hard and floppy disks, audio CD, CD-ROM, CD-ROM XA, CD-I, Photo CD, video cartridges, videodisks
   2.2 input devices
   
   scanning appliances, digital sound and video sampling cards, Videoman
   2.3 output devices
   
   digital video generators, digital transparencies generators
   2.4 display devices
   
   monitors, video [projection systems]

3. **Software**

   authoring systems, expert systems, hypertexts, hypermedia
4. Audio-visual devices

classical appliances (TV, transparencies, etc.) and electronic blackboards.

We ought to remind the reader that if some technologies do modify profoundly the way information is managed and processed - as is the case in desktop publishing and computer generated graphics - other ones have a hardly noticeable impact on actual everyday practice. A good number of so-called 'transparent technologies' remain completely unrecognized by the user and do not affect the way they are operated: telephone communications are nowadays mostly transmitted through digital signals, a fact that most people happily ignore.

DBS television and satellite to dish direct transmissions do, however, indenably increase both the offer of programmes and the broadcasting of multilingual productions. But, for the viewer, the way the transmission and broadcasting is achieved does not change anything to the way a given programme is selected and received, nor does it modify the consuming habits of TV's target audience. From our particular standpoint, the actual problem is not to transmit, store or communicate information, but rather to receive it. This is an issue very much recognized by Berger. The actual question here is about how much data a subject can actually accommodate once acknowledged that he has a limited time-budget and is already massively overloaded with information and communication items of all sorts.

Accordingly, we believe that it is necessary to establish clear-cut distinctions between technical features and technological systems; metaphorically speaking, to differentiate among the different strata of every particular usage. It is the only way to escape being submitted to either a technological or - even worse - to a market-driven coherence for which novelty for its own sake constitutes a mere marketing advantage disguised as an unavoidable technical necessity (Chambat, 1994). The recent development of multimedia represents an excellent example of the dangers entailed by this kind of drift in markets and practices.
To bring a conclusion on these reflections about technology, we would like to quote a remark by G. Jacquinot: new technologies are so as to say tautologically defined but the fact that they are new. Now, such a characteristic has no meaning outside of a given context of integration or use, out of their particular "ecological niche" (Perriault, 1989). The telephone or the overhead projector may still be regarded as new technologies in the context of some under-developed countries with their particular cultural, social, economical and technical situation. To assert this truism is not to try a flash of wit, but rather to demonstrate the specific way by which the notion of novelty is related to the user's appropriation process. To stay with the same idea, Punie et al., remind us that an innovation is not simply a product or a service as such: it is mostly an idea. Innovation is therefore new or innovative only if it is perceived as such by potential users (1994:230; see also the "task-artefact cycle" concept in Carrol, 1991).

Emergence and Usage, An Overview

To reintroduce the notions of user and of niche means to take into full account the relativity of innovation in the field of technologies. It requires a critical point of view on new technologies, a standpoint of a less technical-oriented nature expressed by notion of 'emergent technology'. We would hence define the field of emergence of a given technology as the intersection of three areas, as represented below. In fact, it is a process that cannot be represented by a two-dimensional drawing and that typically evolves, undergoing the following phases: birth, negotiation, stabilisation of practice, evolution and/or degeneration.

![Diagram of users, usage, and technological niche intersecting to define emergent technologies]
We shall not develop here the aspect pertaining to the first two factors: users and niches. Nevertheless, let us briefly remind the reader that attitudes of refusal or acceptance of a given technology, the degree to which an individual is engaged in the process of adopting it, the procedures for mastering it, all these facets are pretty well-known nowadays. They have been the scope of renewed studies since the introduction of the computer in schools (Huberman, 1992). The adoption of a given innovation, for instance, shows a stratification in different groups according to the speed at which a specific population integrates the transformation. At the beginning of the process, one typically finds a small number of innovators (2.5%); then, a group of advanced modifiers (13.5%) is manifest; after that, an early majority can be found (34%) followed by a late majority (34%) to finally give way to late-comers (16%) (Rogers, 1988). If we investigate more closely the insertion niches of innovative technology, this implies analysing the social, cultural and technical space into which a given practice is born, negotiated and fixed, we find a process that expands according to specific constraints bound to the inertia of established usage - and users. Additionally, cases of hybrid practice, mixing long-standing habits with fresh attitudes, also play their part. Along the same lines, the concept of ecology of communication proposed by Moles (1988) is almost equivalent to the idea of niche proposed by Perriault (1989). Finally, let's recall that, in order to be accepted, an innovation has to offer the user advantages both in conceptual and circumstantial terms. Advantages that could be defined as the association of both economical and practical gains (Punie et al., op. cit.:230 et seq.), the economic benefits being direct (cheaper service) or indirect (faster service). Our position is that we should go further in the analysis and widen this strictly economic definition to include the notion of generalised cost proposed by Moles; it would include symbolic parameters such as dependability and consistency of communications, security and stability of connections, modifications of the users' image of themselves, etc.(1988).
### Table 5: The Usages of Technologies

<table>
<thead>
<tr>
<th>AIMS</th>
<th>OBJECTIVES</th>
<th>EXAMPLES</th>
</tr>
</thead>
</table>
| Broadcasting | • To open the access to a large extent  
• To widen the reception zone  
• Information queries | • DB STV  
• Filed courses |
| Browsing     |                                                                            | • WWW  
• Robots and exploration devices (Ways, Veronica, etc)  
• Databases |
| Communication| • Exchange  
• Tutoring  
• Debates | • E-mail  
• News  
• MOO/MUD  
• Audio conference  
• Video Conference |
| Pedagogy     | • According to a taxonomy of pedagogic tasks:  
• convergent vs divergent  
• Information vs training | • Electronic books  
• Educational software  
• Groupware, etc. |
| Professional | • Professional and/or training tools | • Desk top publishing  
• Medical image processing  
• Flight simulators, etc. |

### Conclusion

At a moment when distance education - with the help of maturing communication technologies - makes a growing use of mediated forms of educational communication, we have thought it interesting to recall that theoretical research and research fields do not necessarily evolve with new technological objects: a whole set of problems tackled today with so-called 'new' technologies are in fact old questions: they already stood at the core of 'old' technologies.

To exemplify: auditory and visual literacy were among the main themes of research in semiology which yielded results applicable to the field of psycho-pedagogy during the '70s. It is surprising to see them reappear...
almost as such in research on multimedia and on computer graphics.... Besides, the significance and the sphere of influence and dissemination of technologies have also expanded quite a lot, as well as the political, institutional and economical interest at stake.

Another case in point is the distinction between presentation forms used and media applied. This subject is haunting pedagogical literature and research since thirty years, without having managed to have any kind of influence on actual pedagogical practice.

Finally, the refusal to take into account basic sociological aspects such as user profiles, social practice and environmental niches as well as the exclusive attention given to technological innovation, are attitudes that have negative consequences on the actual implementation of projects especially in the field of communication technologies applied to teaching and are likely to alter their development and their quality in the long term.

It would be a pity that computer mediated communication (CMC), in its contemporary developments, would reproduce the same errors, and hence meet the same failures than other innovative technologies from earlier times. Technology is indeed never as such the vector of methodological evolution, and even much less of a pedagogical revolution. It may at best only be an opportunity for renewal.
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