

Issues in design, creation and production of distance-learning resources



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1. Introduction

The introduction of the Information and Communications Technologies (ICT) as an instrument and context of communication has led to a great potential which reaches almost every element in our society. However, this irruption of technology introduces several questions or problematic situations closely connected to the displacement that some people undergo in their professional role due to the pressure of the new technologies.

Educational and training processes are affected by this same phenomenon, and even though these processes are greatly benefited by integration with the ICT, giving rise to new educational and not necessarily presential, models, thus boosting asynchronous and distance learning, important sources of problems arise: the role played by the communication media in the shaping of associative life, in the creation of training situations and in the development of processes of mental activity.

This is the same as saying that the area of construction of knowledge is deeply affected by communication instruments and mediators that update and dynamize the intersubjectivity necessary for the vital dynamics of the species, for the survival of the group, for cultural creation and for training processes. The introduction of a new system of communication transforms the perspective from which the educational agencies, resources for training, educational institutions and pedagogical professions are understood.

This article focuses on the reconsideration of initiatives for the design and production of educational resources, which can be used in different teaching activities, which expediently combine presential and distance education, through the so-called virtual educational areas. An aspect to be specially highlighted is that, for the design and production of quality resources suitable for distance learning, it is necessary to recover the creative capability of educators, by means of author tools that enable them to co-exist with this technological revolution without being exiled by it.

The rest of the article is organized as follows: in section two the intersubjective nature of the term “culture” is established. The next section studies the nature of the educational materials. Section four deals with the origins of distance learning and its relation to the ICT for the forming of virtual education areas. One of the factors that clearly introduced distance into learning processes was the appearance of writing, a situation that could be compared to the current entry of computers and communication networks, in the sense of the situation of rupture they have entailed in society; thus, in sections five, six and seven these effects are studied and made manifest. Section eight deals with the determinants that should mark the

process of creation of the training materials that should be globally applied to both distance and presential educational processes. Section nine is devoted to presenting an example of what this article seeks to transmit, an author's tool for the creation of hypertextual and hypermedia contents which, by means of a simple and intuitive interface, enables any teacher to transmit his or her experience and knowledge in educational expediently resources. Finally, section ten concludes the article.

2. Intersubjectivity and communication

The colloquial concept of culture refers, above all, to its objective aspects. Herodotus, without using the term "culture", in order to explain the hostile nature of the relations between the Greeks and Persians, sought the origins of this situation and travelled to more than fifty different cultural communities, recording tales about their origins, showing the differential natures of their religion, artistic manifestations and practices of daily life (Cole, 1999, p. 26). Along the same line we find Samuel Baron von Pufendorf (1632-1694) who used the term "culture" to refer to the state of things proper to social life and included in the concept human discoveries and constructions, tasks and way of life, institutions for aid and assistance within social life. The most traditional definitions of the anthropologists are situated along the same line.

However, the concept of cultural asset refers to two elements: an objective element with a material medium (objects, constructions, sounds, words, books or telematic platforms...) and to another symbolic element or element of meanings and value recognized by a person or group. Both elements are inseparable (Cassirer, 1951, p. 68). Meaning is only established, i.e., takes on a social form, when it is recognized by the group and acquires use value when it is incorporated-enjoyed by the subject. Hence, one of the features of all cultures consists of the criteria and procedures of distribution of cultural assets and of processes by which culture becomes accessible. Among these criteria in many cultures it is seen that, for example, the sex variable (culture of men and of women) or the age variable have worked as distribution criteria. The revision of the legitimacy of these criteria and their confrontation with personal and collective aspirations is a permanent objective for cultural criticism and the foundation of the non-discriminator principle of culture for all.

Hence, the term "culture", besides having an objective nature, also necessarily has an intersubjective feature. To be exact, the Latin word "cultura" designated "cultivation" (land, trees, animals...) and, by extension, the "care" of something. It seems that the first time the word culture was used metaphorically, in an educational sense, was in Cicero's "Disputaciones Tusculanas" (106-43 a.C.), where it is affirmed that "philosophy is the culture of the soul" (Ad, II,5,13: "Cultura animi philosophia est"), because, through it man reaches the ideal of humanity, our truly human condition.

3. The materials with which the mind operates in culture

The materials the mind works with arrive first through the channel of communicative action. In this process of communication, above all, the body, bodily expression and language are involved. From their integration there arise not only the declarative utterances susceptible to truth and falsehood, but also the set of different categories of "speech" acts. Not only do we utter, but also by communicating, we "do" many other things: convince, insult, bequeath, pray... In this communicative environment, the main process is conversation. From this perspective, culture appears as a system of conversations and cultural confrontation reflects that it is a "closed" system of conversations. It leads to understanding inside it and promotes a lack of understanding towards the outside.

Within interpersonal communication, within the intersubjective situation is where all cultural tradition and the whole stream of cultural assets and services gain meaning (Cole, 1999). Hence, the enormous importance in pedagogical work of building the scenario and the suitable context from which the learning project takes on meaning. This approach brings face to face two pedagogical, often uncompromising, perspectives: that of those who think that the

main part of the teaching process is knowledge of the subject and that of those who think that the main thing is the stage constructed. The activity of knowledge production has two facets: that referring to the creation of knowledge and that referring to the ability to spread knowledge. The mind works from the content of knowledge and from the “communicational artifices” for knowledge.

Since Vigotsky (1996) we have been used to calling the objective components of culture tools of thought, because within the intersubjective area, the social sphere, the area of construction of knowledge... changes from the “store of experience” into instruments for generating knowledge.

Since the introduction of the expression homo faber we have become used to understanding technical activity as the most characteristic skill of human beings. The epistemology of techniques took the artefact, as its main point of reference. In this article we defend the need to broaden the notion to that of artifice. If this change in perspective is not made it becomes impossible to note the wealth of communicational artifices that conversation sets in motion, we lose sight of the importance of the literary artifices through which new forms of thought became possible as a consequence of the introduction of writing, and we will not see the importance of working on the artifices of information to develop the forming of thought in the Information Society. If this is not included, the philosophy of techniques will find it difficult to intersect with the primary objective of culture as a system of the systems for forming human beings. Rarely does the philosophy of technology incorporate into its horizon the web of artifices that were generated in history for the “transmission”, incorporation (Vigotsky, 1996), and assimilation (Piaget, 1970) of cultural contexts.

Human instrumental action produces objective modifications in the human world as a consequence of activity addressed to achieving goals. Among these goals, there are also those of training and those of facilitating access to knowledge. We include all this in the general concept of Pedagogy. This is the approach that legitimises the use of terms such as narrative artifice or curricular design. In their design these artefacts-artifices for teaching contain resources for human mental activity, a form for thought. The objectives of education are formulated verbally, but, above all, they take form in the artificial materiality of the design that holds them: these instrumental designs are at the same time material products and mental products, matter and idea.

Reflection on educational action completes reflection on cultural resources in the sense that the intersubjective processes that characterize social life act as mediators of the process of subjective appropriation of culture. On doing so, they show all the facets of the cultural resource:

- 1) its materiality as a product of an action in the world of culture;
- 2) its mental contents as regards design;
- 3) its quality as an artifice expressing knowledge;
- 4) its value as a socially shared resource. The first facet is the medium, and the others are the significance of each of the cultural resources.

4. Distance Learning

Once the human being is integrated in a social context, which is essential for her survival, the fundamental mechanism for the acquisition of knowledge is, therefore, intersubjective communication: the context of this communication creates the knowledge building area within which an asymmetrical relationship is established between the one who knows and the one who knows most. Specific symbolic mediators intervene in this area, and they act using the resources of internal memory of the interlocutors and external preservers of experience such as speech and its linguistic codes, schemes of body language... The procedures for incorporating knowledge are found associated with “communicational artifices” that facilitate the incorporation and facilitation of memory.

The primary context of teaching in oral cultures is conversation, the ritualization of action and

the imitation of schemes for action. Once the mind is fed with these mediators, an education in direct relationship with the happening or with the situation becomes possible. Subsequently, the subject, on recovering resources of his internal memory, performs the “serious game” of rehearsing innovations in action. We usually call this scenario of communication in the presence of the interlocutors “presential” and the learning generated in it “presential education-learning”.

However, in the “knowledge building area” a communicational distance has already been established between the one who seeks knowledge and the one who knows. An attempt to bridge this distance is made by the communicational mediators and the communicational artifices that the interlocutors use. In order to understand this, it is essential to situate the “locus” of knowledge not within the particular subject but outside, in the intersubjective area.

Within this framework of educational communication, the discovery and application of communicational functions other than speech and body language was a fundamental advance, creating the possibility of increasing the capacities of external memory through the “invention” of new artifacts-artifices for knowledge. The most successful one in the history of culture was the application of the graphic function to symbolic communication.

Presence in education was a requisite of oral societies because the educational process was centered on “imitation”, on the presential reproduction of the “authoritative action” of the expert. Distance was introduced by writing when it separated the condition of author (absent) from the condition of reader, by posing the need to create a learning space outside the vital context and to set “pedagogical action” in it; the finished product is described as a content of thought, a formal and abstract action. Since then, nobody who gives classes on agriculture has to be a farmer nor does he have to show how to plough the land. The distance that we are speaking of in the ICT is neither more nor less than the possibility of a new form of communication which not only makes it possible to do the same things, without the presence of the teacher, but also makes it possible to do many others that cannot be done either in the presence of him or using only books. We are facing the possibility of integrating into the educational areas a new system of resources that we call virtual, no matter how much we can really play, communicate, create real learning resources or have cooperative action take place between teachers and students. Therefore, although we have the ICT, the objective is not distance, but rather, in the new context, to build and develop renewed and integrated areas of learning; we shall call those virtual educational areas (García et al., 2001).

5. Writing as an instrument

Writing is usually described by taking into consideration its nature of instrument at the service of symbolic communication. This means highlighting, above all, its subordination to the spoken word, as is shown in the operation of reading: writing as the mere transcription (Saussure, 1952) of speech. Writing shows many aspects of dependence on the word, especially in cases of syllabic and consonantal writing. But it has many other aspects where the graphic expressions work as a complex scheme, comparable to the phenomenon of speech, but different: as another way of speaking, a field of symbolic production (Cardona, 1994) created by man. With writing some authors consider that a new mental area was born, a new ecosystem for thought, which marks the subject in such a way that it makes it impossible for him to return to his oral past (Illich, 1998, p. 43); they value writing as “a tool superior to speech”, because it makes expression more public, more accessible to more people, it makes meaning more reconstructable. Apart from exaggerations and evaluations, writing would represent a second milestone, the one that follows the word in the cultural evolution of humanity (Havelock, 1994). Perhaps the most influential exaltation of reading-writing is the one made by M. MacLuhan (1975) in his work “The Gutenberg Galaxy”, where he affirms that the form and meaning of Western man was constructed from the integration of a sound without meaning and a graphic sign without meaning. In this case, we are considering its aspect of techniques and artifice. Thus, Olson (1998, p.14) calls written productions “literary artifacts”.

Some authors think that the cultural changes associated with the changes in the communication media contribute to the transforming of social and institutional practices; cognitive practices are maintained almost constant because they are specific. Others believe they can demonstrate that these cultural changes are linked to psychological changes, of representation, of growth of rationality and of forms of conscience (e.g. Olson and Goody). That is, besides being a new mnemonic register (previous ones, among others, were the word and the rite) writing involves a new epistemic function: the very structure of the activity of knowledge was affected; hence it is understood to constitute a decisive factor in the appearance and development of science. All coincide notably in the conviction that “a written system is a visual phenomenon at the same time that it is a set of cognitive skills” (Bennet & Berry, 1998, p. 135). The main problem is to identify the mechanism by which the transformations attributed to written culture are produced.

Goody (1990) indicated that in at least three general spheres of cognitive processes there is substantial, although not systematic, evidence of effects deriving from writing: the extraction and organization of information, the forming of behavior plans and the elaboration of general theories. The progressive dominance of information mediated by writing modifies the system of social relations and roles, for example, the social role of the elderly and the formative role of the family. It creates an unbreakable tie between school and writing, foments the predominance of the visual channel of information over the auditory channel (the argument of having read it) and the role of the textual quotation as an argument, the verification of content by text, the reorganization of the information in the content, the increase in the visibility of the classifications, the growth of the timeless dimension of language, a deepening of the hierarchical nature of the meanings and sequence of argument, a predominance of memory by packets of meaning versus word for word memorization, an increase in the role of mechanical memory of content imposed by the fixed nature of the school text, separation of the roles of cultural transmission (composer-interpreter, playwright-actor, author-editor...).

Writing introduced new forms of communicational distance associated with the fostering of knowledge. The book is an artifact of distance communication full of literary artifices in agreement with it, through which it becomes possible for the medium to move with the knowledge, eliminating the need for presence between the communicators. Moving the medium solves cultural communication. In order to make learning possible a new competence is thus required: to know how to read. Writing modified the field of human opportunities and opened a new order of initiatives to be taken. Reading and writing historically establish a value of humanity and set a technical objective of education and an objective of technical education.

From these studies it is derived that reading-writing is not mere instrumental learning, but rather the incorporation to the system of resources (beyond mere transcription) which are provided by writing with a view to a whole set of personal and social tasks; these resources evolve in co-derivation with the learning of the skills for exploiting them according to highly diverse social and cultural goals. The complex resources of the reading-writing system and the skills developed for using it in action provide the higher mental functions with new qualities of operation. It cannot, however, be affirmed that all this entails a change in the structure of the mind.

6. Educational Activity in the Information Society

The perspective we have applied to the analysis of educational communication in oral and reading-writing contexts is now being extended by many authors to the study of the pedagogical applications of the ICT: tecnopolis (Postman, 1994), telepolis (Echeverría, 1994), telepolitás (Echeverría, 1995).

All human society and all culture are established within the flow of information. Culture is a functional system that operates from information and produces information (Mosterin, 1994). The introduction of a new system of communication, not a new language, or a new system of gestures or body movements, but rather the invention of a communicational artifice with the

direct intention of expanding the properties of the biologically arranged human system of communication, will entail the recomposition of a whole stratum of the system of interactions in the area of knowledge building, to be exact, the most public one. The recomposition will bring in its wake a reorganisation of the social structure, of the organisational possibilities of the social fabric and evidently a generational fracture because it situates the adult generation face to face with the new ways of informational dependence generated by the intruder. To paraphrase the thought of Castells (1998, p. 86), this new cultural paradigm is characterized by the following:

- Information radicalizes its nature as a raw material; the technologies that act on information dominate versus information that operated on technological development.
- Technological mediation interferes in the globally of the action of the social system.
- Deepening of an on net logic of the applications, reticular morphology of the places of activity they promote, overcoming spatial restrictions.
- Deep changes in the categories from which we think all the processes of human practice, introducing the categories of complexity, as a new way of considering diversity, and the creation of places of information of shared activity.

6.1 The digital sign

The basic process of development of all this technology is still that of separating the construction and analysis of the sign from the meaning it carries. The immediate consequence is the separation between “digitalized textuality” and the experience of its “reading through a given programme”. There has always been an integrated, but parallel, development between the interfaces of the medium and the evolution in complexity of the communicational content. But in the case of the ICT there is a considerable difference from the other communicational systems referred to before. In the ICT content a mathematical theory is constructed which makes it possible to translate the representation of any reality (visual, auditory, iconic or models of dynamic systems) to a binary numerical code (digitalize); the equivalence between the logic of this theory and the properties of circuit commutation allows the construction of electronic tools that act as a medium for the identification, storing and processing of the signs of a communication system.

The consequence of the fact that informational communication is based on the ICT is the differentiation of the condition of author in this context in at least three large categories functions:

- (i) The hardware devices engineering for the construction, storing and transmission of the sign.
- (ii) The engineering of software tools or of the artifices for processing and operations with the signs, which we shall refer to as “contents-1”.
- (iii) The elaboration of systems of schemes of meaning, which we shall refer to as “contents-2”.

Usually, only (iii) was designated as content; but if the interfaces of the medium are also functionally active, they are also instruments for thought and hence (ii) forms part of the content, at least in the structural sphere of mental operations. This situation may cause a process of supplanting of responsibilities of authorship and a hypertrophied growth of (i) (ii) with respect to (iii), something which is perceived as the need to fulfill the condition of engineer in order to be able to be actor and author in the Information Society. We understand the rethinking of educational resources as a strategy of the three functions integration.

If the characteristic author product of oral culture is conversation, that of reading writing culture is the text, which in its most elaborate form is the textbook, either scientific or literary, both are treatises on expressive artifices or compendia of mental activity. The author product of the Information Society has as its basis the hypertext in one of its formats, whose characteristics could be summarised thus (Landow, 1997):

- Permanent reconstructivity of the text, because the text is always open to construction-reconstruction, both by the possible authors and by the potential users.

- Heterogeneity of information because the medium allows multi-media or multimodal communication (text, sound, video...) and interaction between the actors in the situation.
- Reticularity of the configuration, and not mere sequentially. The encapsulating of information has a fractal modality in the sense that from each node of information one has access through many paths to all the information. Hence, together with the process of reading there appears another one of a different qualitative nature called navigating through the text.
- Decentring and topological organisation of the information or organisation through links, which, together with connectivity, liberalises the concept of a plan of information. On principle, there is no first or last page strictly speaking (lexia), the concept of index disappears, giving way to infinite routes.
- Creation of three-dimensional scenarios where the subject, both individual and group, may project all possible "masks" on the scene and the role of the simulacra.

The hypertext better simulates the procedural mode of human understanding in which reticularity takes priority over sequence. It recovers the basic function of tutoring (tutelage and care) that staged the action of education. It can be integrated into expert systems so that the user not only navigates through the information but also organizes the information being personally acquired.

The hypertext system allows cooperative work and the creation of what P. Lévy calls *collecticiels*: cooperative communities -many can intervene in the same things. To the value of personal ingenuity (academic intelligence) it adds the capacity for joining skill with collective multifocal projects, which can be taken advantage of and profited from in many distance learning initiatives through the ICT, where a group will share at least some common learning objectives, with cooperative collaboration being feasible to reach this goal. A clear example of virtual cooperation can be seen in virtual seminars (Moreno et al., 2000).

Computer technology develops precisely by increasing the interfaces and sweetening the relationship between the computer and the user. This way the computer has progressed from machine for automating calculation, to technology for the intellectual activity of human groups, to scenario for the creation of communicational communities. With the same brain the groups achieve an overall increase of the range of activity -their spectrum-, the quantity and complexity of the activity. The computer is progressively becoming a context, an ecological niche of mental activity. Attention does not focus so much on the design of the machine as on the configuration of the projects, the ICT have proved to be highly versatile for response. This paragraph refers to the computer as a workstation.

6.2 Network Communication

The major historical milestone in this sense is the birth of the Internet in the middle of the eighties, a worldwide network of computers that integrates and affords the collaboration of users connected to completely heterogeneous machines without problems. However, the potential that this network contained became evident when in 1989 Tim Berners-Lee of the CERN proposed a system for the exchange of multimedia information based on the idea of the hypertext; the World Wide Web (WWW) was born. The success obtained by the WWW lay in the fact that, besides being a highly suitable system for the publication and circulation of multimedia documents through the Internet, it offered an integrating role for all the other services on the Internet by means of a simple and intuitive interface, which welcomed users and invited them to share in the tremendous possibilities that this network offered. Further information on the origins and evolution of the Internet can be found in Leiner et al. (1997), Griffiths (1999) and Gromov (2000).

All the services offered today on Internet (e-mail, FTP, chats and so on) can be used as tools in an educational environment whether at a distance or as a complement to more traditional presential classes.

We are facing a technology that is not merely semiotic, but the evolution of the technology-user interfaces, facilitating and familiarizing the use of technology in accordance with the

potential interests of the subjects; this is the mission the different suppliers and access platforms, firms of on-line services, corporative networks or intranets... Along the lines of facilitating infrastructures we have optic fiber connections, Switched Telephone Network (STN), connections by cable, the Integrated Services Digital Network (ISDN), Asymmetrical Digital Subscriber List (ADSL) and so on.

The web sites and navigators make the Internet a “telepolis” with no barriers and pose as a new goal for educational actions the learning of strategies for research in web sites and navigation in search of information, within the hierarchical level in which other instrumental learning is situated. No teaching professional would hesitate to identify educational tasks within the system of oral or reader-writer communication. We are witnessing the development of the “third environment” but, where are the educational functions? Where are the people responsible for them?

7. Masters of the Air

With the introduction of writing there was a “generational fracture” between those who wrote and those who did not. The effects of this fracture gradually became evident over the centuries, until the problem of illiteracy became a major social problem. The ITC have created a new generational fracture. Negroponte (1995) expresses this clearly: the true cultural division is going to be generational. When in our surroundings a group of adults is discussing the computerised society, it is most likely that they have children at home who use computers or handle computer interfaces with surprising skill.

Here the generational fracture has ramifications, since underlying informational communication there is not merely a technique, but a “theory” and a “technology”. This generational fracture is not only a reference to a life cycle, although it is also that. The cycle combining childhood with education and adulthood with occupation is definitively broken. Life-long education and the adult as a genuine subject of education has become the norm, with greater intensity in the more developed countries. The break is also professional; generations can be divided as being before or after ITC. It is not merely a process of functional differentiation; it also entails a process of functional “disqualification”, of the potential loss, very often real, of the condition of actor in a large number of occupational sectors. The masters of the communication networks appear, the owners of the technologies, the owners of the programs, those who possess the complexity of knowledge and skills necessary for the creation of cultural resources in the communicational space defined by the ICT.

Years ago this same kind of fracture gave us the term functional illiteracy when literacy was incomplete, when although possessing the technical instruments for reading and writing, the cultural use of them was incomplete and did not allow the person to enjoy and use the basic core of cultural wealth (basic culture), either in the cultural-scientific or the professional sphere. Both social participation and professional practice require this incorporation of basic cultural wealth, because the democratic states found the practice of citizenship on great transfers of agreed upon information and professional practice requires huge and continuous amounts of information on instrumental and technical designs. Nowadays, nobody doubts that maintaining one’s professional occupation and incorporation into the new professions require a constant recycling of one’s education.

This state of things fosters the appearance of new kinds of marginalization and disqualification, which were analogously present in the illiterate condition in literate cultures: how can one continue to be an actor in the Information Society?

8. Conditions for creating educational resources in ICT environments

Generally one begins by indicating that the first condition refers to equipment. Our work experience in the Laboratory of Multimedia Educational Design and Tele-Education at the Educational Sciences Institute at the University of Salamanca has convinced us that the first

problems to be overcome have more to do with social intelligence than with technical capability.

The creation of teams for activating processes for the production of educational resources is becoming essential. Increasing the technical capabilities (i.e., capacity of the network, speed of calculation, storage capacity and so on), is simply increasing the potential capacity of the quality of action that can be carried out within the possibilities of the technical system. The objective is once again to reuse the available human resources to reconstruct the educational functions made possible since the new system of communication was introduced into the context. This requires a capacity for integrating the knowledge from communication and software engineers and from the accumulated experience and relational skills.

The value of the symbolic content is not constructed by the ICT. The new materials produced by “e-authors = interdisciplinary teams” are becoming more and more necessary. The speculative changeability of ICT enterprises has meant that, for some, the objective is the production of educational resources that could invade the market. The main objective is not economic but rather that of not squandering human resources that the new ICT context marginalizes that of recovering the author capacity disqualified by the very nature of the ICT context. A priority objective in educational institutions is the creation of “e-author-interdisciplinary teams” with the intention of recovering the capability of creation in the new area. We are aware of the difficulty entailed in the creation of these teams and the production of these materials, since we have been involved in starting them up. In the future it ought not to be possible to have an education faculty or teacher training center without the existence and activity of a laboratory for the design and production of educational resources that could be applied both to pure distance learning and to reinforcing traditional teaching activities.

At present the production of resources is linked to the use of ICT, regardless of whether they are produced for distance or presential learning activities. It is a gross error to associate the ICT with distance education. The question is what can be done within the socio-cultural objectives identified and with the available evaluated real resources? ICT are not instruments for distance learning, but rather instruments for collecting, elaborating, storing and distributing information.

Hence, before, or at the same time that we pose reasonable questions concerning education at a distance; we have to consider the use of technological resources for improving the quality of programmed education. In the ICT context, a fundamental parameter to be evaluated is the level of competence that can be capitalized for the training of educators and those with a decision-making capacity in education, because decision-making takes place within a debate on reasonable action.

1. The first range of political decisions has to do with communicational equipment and infrastructure at the training centres; with the reorientation of spending priorities in family units and in the consumer demands of adults, because in all cases access to technology is incorporated to significant headings in personal or family budgets. Whereas in writing we could speak of owners of books, paper, or writing materials, here we must speak as Javier Echeverría (1999) does, of the “Masters of the Air”; the equipment involved in the communication system has a very high cost, which has to be shared. From the point of view of the information environment, as from that of the global economy, the principle of “our poor are poorer” is valid; access to the ICT environment has an added cost. There is a need for new forms of social control of the equal distribution of wealth and opportunity, new subjects for the debate on social justice.

2. From the point of view of education, the most pressing concern is the production of educational contents, contents which, given the current situation of the knowledge building area created by the ICT, as yet do not have such a defined, clear, diversified and recognisable market as the book. Furthermore, the ICT are creating author tools that allow the construction of educational contents, but the complexity of handling them removes the condition of author from most educational agents. Thus two lines of work and research for interdisciplinary teams

appear: a) there is an urgent need to create user-friendly interfaces that will allow those who are functioning as authors of contents in the reading-writing context in educational institutions to be recovered as such (b) it seems to be equally urgent to identify and organize skillful and innovative educators to create motivated teams for the production of educational resources. The value given to participation in training course has to be at least equivalent to that given to the work of producing educational resources for collective use.

3. The possibility of education in an open network generates new possibilities for cooperation between teams of teachers, for the tutoring of student activity, for the access of students to complementary information of collective use... At present, the Internet is an open field for relating with information, without tutelage and without a plan or curricular design, except in the so-called virtual education centers. We believe that one political objective is that of recovering in the new context the concept of learning institution, in this case, based on information. The way may be that of the creation of intranets or corporative networks. This would make it possible to recover the concept and the initiative of movements of pedagogical renewal in the ICT context.

4. The redefining of the concept of life-long education of the teaching staff through collaborative communities on the network, which is favoured by the services of discussion forums, both synchronous and asynchronous, as well as other platforms of cooperation that could be designed.

5. The reformulating of the concept of educational agent of the system by extending it to professionals in education who receive the responsibility of maintaining the platforms of assistance and of collective resources at a distance. Working for the same users of the same teaching level, with the same curricular design, but working at a distance and making the information accessible to the network from which other teachers and students take it.

6. Pedagogy in the ICT context must create Laboratories of Multimedia Educational Designs and Distance Education, with the aim of designing, constructing and producing components for virtual education areas (Echeverría, 2000; García et al., 2001). The telematic engineering and computer technology applied is making it difficult for educators to continue being creative. This could be recovered by means of multidisciplinary teams that reflect on the multiple needs for education.

7. The most evident general fracture and its most reliable proof is that which is occurring at present among the children who come to the classroom who are users of computers in their homes and the schoolteachers who may have already lost the illusion of continuing to be actors, almost without having even tried to take up the "new pen".

8. We find that the main problem of an educational policy is once again teacher training in the new information context: the education of educators. The priority is not to train them in the use of sophisticated computer tools. The plan for teacher training should correspond with the project of action in which they will be involved. Also, teacher training should be diversified, personalized, permanent and situated in a context where ICT can be taken advantage of, within which they are asked to be educational agencies. We must recover local and regional initiatives for pedagogical renewal.

9. Facilitator for the Composition of Hypertexts

An example of what we have been discussing is our project ENCLAVE-Compos-1. We started from the fact that the hypertextual-multimedia structure is characteristic of an ICT educational resource.

The ICT instruments for the creation of these products are highly sophisticated, and not within the reach of the skills of university professors not experienced in their handling.

Thus, an objective of "e-author" was the design and production of an author tool that had the

mission of facilitating the composition of hypertexts, so that, by means of a simple and extremely intuitive interface, any teacher, with a minimum knowledge of computer science could transform his or her experience and knowledge into useful, quality, educational resources. Thus, we recover the teacher as author if, as our experience has frequently shown us, he or she had been left out of the playing field due to the technological filter.

With the incorporation of multimedia environments, the role of the teacher as a mere transmitter of knowledge changes towards functions of organization of learning activities, thus giving the student greater autonomy and responsibility in the quest for education. Another achievement is that the student plays a more active role in the educational process, favoured by the new technologies, thus being more motivated to use the available information sources, as well as those recommended. Moreover, these innovations cause a change in the concept of classroom, seen as a physical entity, so that the notion of the virtual classroom is taking on greater meaning, a space that the student can use without restrictions of time or space; this reality becomes more evident with the incorporation of telematic facilities to education through the Internet and the proliferation of virtual portals devoted exclusively to education. All these contributions promise more effective learning that will have positive repercussions on the students' subsequent action in present day society.

The facilitator for the composition of electronic documents is at the same time an author (or administrator) tool, and a user (or reader) tool, so that it encapsulates the whole complexity of handling the current tools in the facilities that the author needs, and offers as a result a didactic product (Aedo & Díaz, 2000), hypermedia and multimedia that can be distributed in different formats that will facilitate for the user the information contained (CD-ROM, web sites, printed text...)

The basis of the work is a document with a hierarchical structure, typically accessible through an index, where each thematic unit (lexia) may contain text, multimedia material and links to other units or documents.

The author mode of tool uses the metaphor of the hierarchical navigator, which reflects the structure of the index of the document being made. The author can create new levels as required. There is a work area in which the contents appear associated with the entry of the index selected.

As added facilities, besides the typical services of document management, the tools include a bibliography handler in the purest LaTeX style and the products are stored in XML format.

The objective of the tool is to be able to compose a multimedia document with both text and multimedia, without any special knowledge. That is, with this tool, we can easily construct an "electronic book" in which we have been able to insert images, sounds, videos, bibliographic references... and maintain it all perfectly ordered through the capability the tool provides to handle chapters, sections and all the subsections necessary for keeping our document organized.

The organization of the user interface is extremely simple, seeking to offer the greatest simplicity and intuitive handling on the part of the user. We have a very broad working area, as can be seen in figures 1 and 2, owing to the fact that the working basis is formed by the initial textual information. Here is where the greatest workload is carried out, the text being written directly on this area. Sharing the screen there is a tab on the left, which is the index of the document and will remain hidden although accessible at any time until we extend it with the mouse. In the upper part of the same screen there are several menus, which will appear contextually to give access to the different utilities required in each activity in the process of constructing the document.

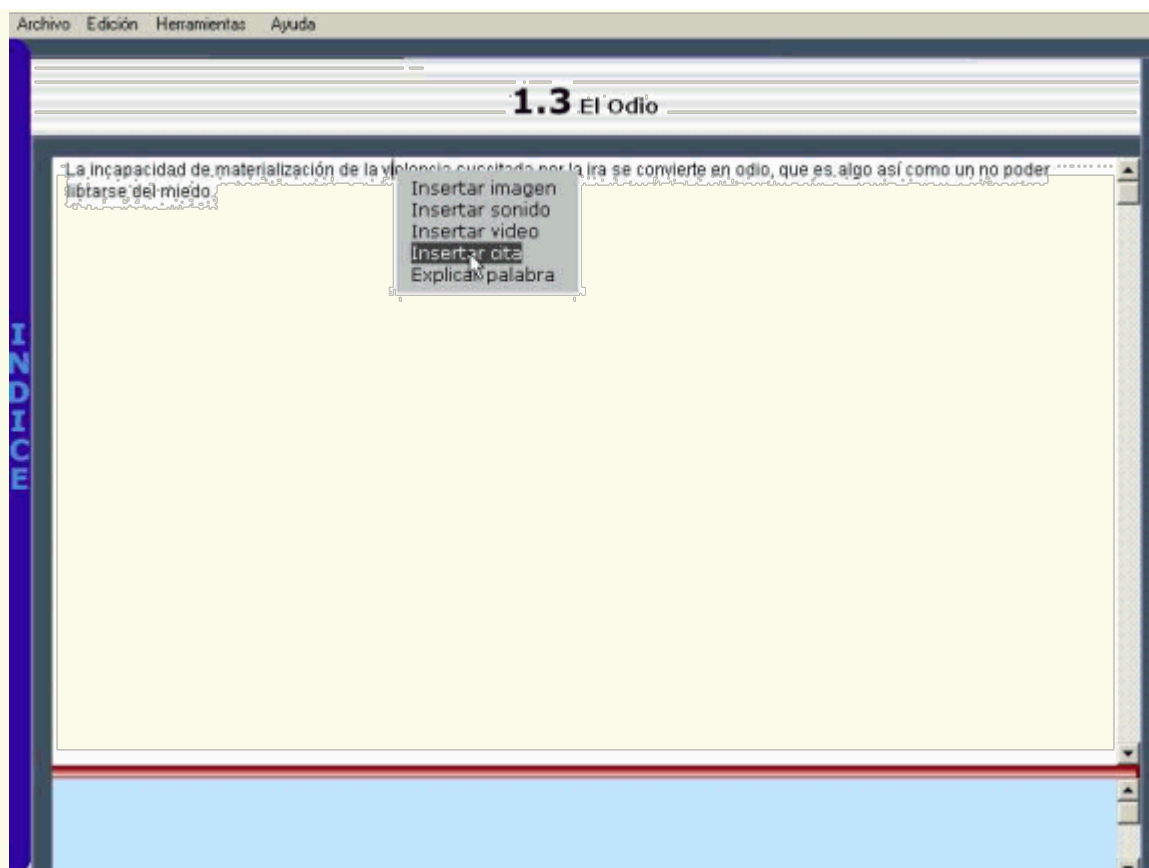


Figure 1. Work area with hidden index

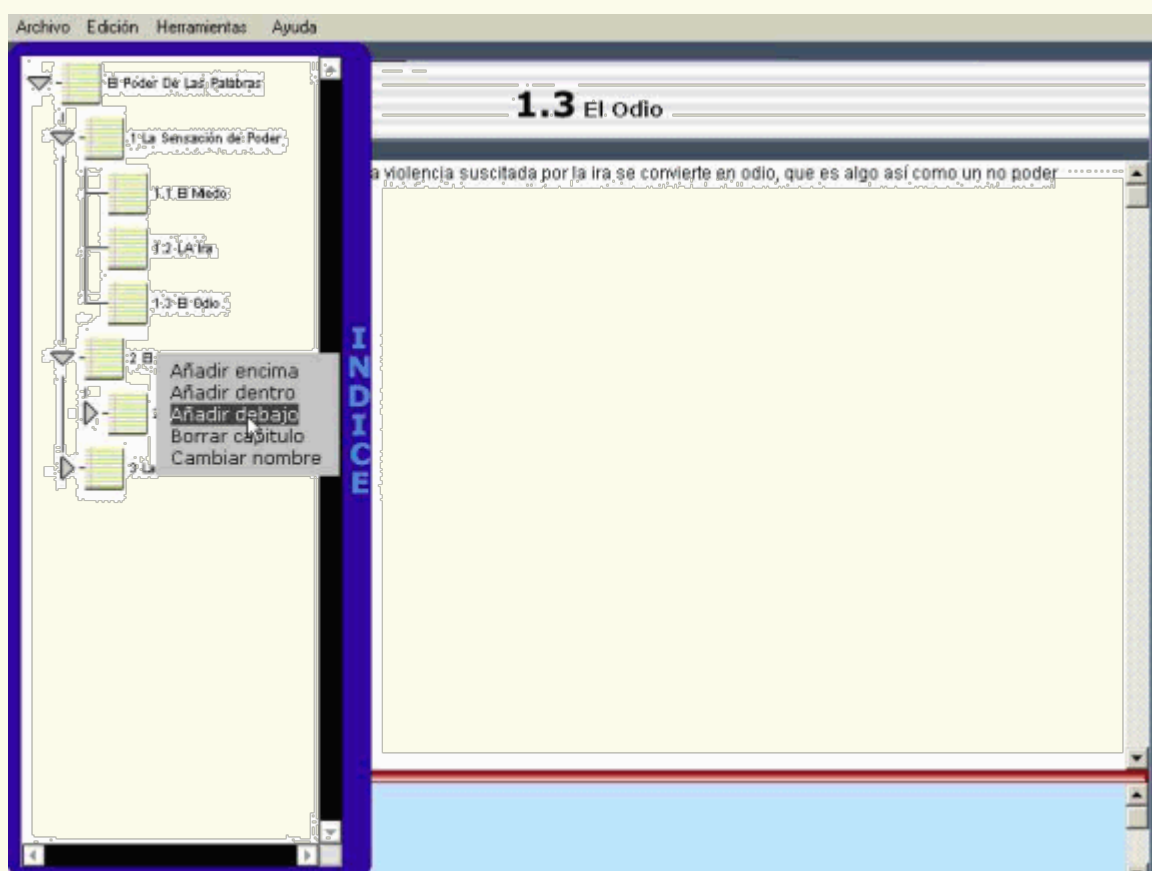


Figure 2. Displayed index

As the user writes the document, there is also the possibility of importing text from any other external documents; the textual information appears in the working area. With the right-hand button we can click onto the area described to obtain a contextual menu that will indicate the possibilities of manipulating the material at each moment and location.

One of the most important utilities of the tool is formed by the so-called Galleries, which are viewers and managers of all the information classified by types that the user is inserting in the document and that is handled by means of internal data bases, which are totally transparent to the user. The tool has four galleries: Multimedia Gallery, Style Gallery, Quotation Gallery and Exit Gallery.

The Multimedia Gallery provides control over all the multimedia elements that we have inserted in our document, with the possibility of reproduction. Thus we can quickly find out what we have and what we do not have in our document. The Style Gallery allows us to format our document, choosing the font, the color of the links, the type of bibliographic reference or quotations, and so on. One of the key points in every scholarly document is the bibliography it presents; maintaining the references to be included in the documents we create is usually a tedious job, and in order to make it easier we have incorporated the Quotation Gallery, which, with a minimalist interface in the interests of simplicity, enables us to perform all the operations relating to the bibliographic references in our document. Finally, the Exit Gallery has the mission of handling the exit format of our document. Since this is stored in the tool's own format, the tool provides exits compatible with other tools. Mainly two spheres of work have been taken into account, the one relating to the text and that of the network. As a basis we provided for Microsoft Word and Internet Explorer. In order to make our document compatible with Microsoft Word, the work can be exported to RTF. For compatibility with Internet Explorer, we opted to export the document in XML format because it has become widespread recently and because of its incredible capability of adapting to different platforms.

This last aspect is of great relevance because, although by using the tool in its reader mode, the receivers of the book can consult it without problems, a dependence on the tool is being introduced which is undesirable. Thus, with the Exit Gallery it is possible to make the educational resource independent of the platform destined for its publication (web server, CD-ROM...).

Although we have a completely operative author/reader tool which fulfils all the requirements with which it was defined, the work is far from being finished, since new facilities are being defined so that, without adding complexity to the handling, a cooperative operation will be established to facilitate the creation of educational resources by groups of geographically scattered teachers, besides enriching the bibliographic styles and exportation formats it has.

10. Conclusions

First, it gives the diverse determinants that must be taken into account when creating teaching material, where social intelligence for the forming of interdisciplinary teams is an aspect with at least as much relevance as being up to date with the latest technological trends.

Moreover, and in the authors' opinion, the creation of educational contents or resources using the ICT is not limited to distance learning, and should be taken advantage of both in distance educational processes and as reinforcement in the traditional or presential educational processes. The context that the Internet and especially the Web offer us is suitable for exploiting this potential.

One of the major concerns of our work group is the barrier that the ICT impose on many teachers, who find themselves technologically ostracized and excluded from current educational processes. Our intention is to recover them as authors of educational resources for distance learning, creating tools made to suit them rather than computer and communications experts, with easy to use and integrating pedagogically designed interfaces.

As a practical example of what has been presented here, we have introduced one of the diverse tools that our group has developed. In this case, it is a tool included in the category of "contents-2". It is an author tool for the creation of educational resources or hypermedia electronic books. It is our hope that the use of the tool will enable teachers without a great

knowledge of computers to generate auxiliary material for their teaching, thus benefiting teaching as a whole.

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