

Virtual Classroom and Communicability: Empathy and Interaction for All

Francisco V. Cipolla Ficarra^{1,2}

HCI Lab. – F&F Multimedia Communic@tions Corp.

¹ ALAIPO: Asociación Latina de Interacción Persona-Ordenador

² AINCI: Asociación Internacional de la Comunicación Interactiva

Via Pascoli, S. 15 – CP 7, 24121 Bg, Italy

ficarra@alaipo.com

Abstract. We present the main empathy components in the design of interactive systems aimed at classroom and E-learning education. These components have a bidirectional relationship with communicability and usability. Each of them depicts an intersection of communication, semiotics, interface design, software engineering, usability engineering and human-computer interaction. Additionally, we present a table which can be used as a communicative quality guide. Its content is the result of 20 years of design and heuristic assessment of on-line and off-line interactive systems, mainly for Americans and European users.

Keywords: Education, Virtual Classroom, Hypermedia, Communicability, Design, Information, Empathy, Interaction, Accesibility.

1 Introduction

Education is one of the cornerstones of the growth of societies. Technology in the classrooms in many institutes of the eighties were classical audiovisual systems, through the projection of slides, in some cases the voice of the teacher was accompanied by real sounds in order to increase realism [1]. It was the time of sequential multimedia, that is to say, classical technology of multimedia stemming from print and television, characterized by the lack of informatics [2]. The sector of printing and graphic arts is one of the main contexts when we talk about contributions to visual communicability. Then we enter a short period of partially interactive multimedia. That is to say, emulations of manual operations controlled from the computer, such as the advance of a video in a CD-Rom support [2], [3]. And then we arrive at fully interactive multimedia, where each source of information is in a digital format and allows a high degree of user-computer interaction [4]. The first to show a great interest in digitizing information in Europe was a sector of the graphic arts in the nineties, aimed at distance education.

However, there is not yet a unique interactive multimedia technology within the digital environment. Obviously, remarkable breakthroughs have been made in the basic technology (hardware), nonetheless, such issues persist as: the tools of the software do not yet use the whole potentiality of the hardware (it is enough to see the statistical data that show that the users ignore 100% of the functions of the mobile

phones in Italy, for instance, and yet they keep on demanding more functions), multimedia systems are based on partial design models, with primitives not unanimously accepted in the computer context, of human-computer interaction, usability, etc. [5]. Consequently, the lack of a unique model causes in many cases time loss of human resources. The only way to solve these problems is by resorting to basic notions of the historic concepts within international circulation. In the current work there is a brief description of the state of the art at the beginning, then follows the eradication of ambiguities in the essential notions of communicability, information and communication. Later on the empathy and the interaction is analyzed from a diachronic perspective with examples and finally an heuristic table is presented for the first assessment of the empathy applied to the educative and interactive systems, on-line and off-line.

2 Eliminating Ambiguity in Hypermedia Systems

It is important to carry out in some cases the anchoring operations of the relationship of signification and significance of the terms, as is the way in semiotics framework and linguistics [6]. For instance, in the later stage of the evolution of interactive multimedia systems, we have the notion of hypermedia, which is an hybrid word between hypertext and multimedia. Here are assembled the advantages of both technologies inside the multimedia communication process. As has been observed in the origins of hypertext, where the textual aspects of the first systems prevails (including static graphics, in a broad sense), where it is established the associative character in the structure of information (these aspects generate a less frequent denomination in hypermedia systems, such as is the case of the electronic book). Whereas in multimedia and through the intersection of media there is a dynamic content of information: video, computer and audio animations. This dynamic component entails the time or synchronization factor among diverse means, which in our case we call panchronism. (From Greek 'pan' meaning all and 'chronos' meaning time [5]. A panchronic approach to, say, language is an approach including every aspect or all dimensions of time.

Measurable quality criteria is very important in the communicability of on-line and off-line contents of hypermedia systems [7]. Consequently, hypermedia in a classical sense of the notion allows: selected access to those parts determined beforehand by the user, a greater degree of detail in the structure of information, that is to say, it is possible to resort to the richness of the content, in regard to several means used in the transmission of messages and reinforcing the communication process [8]. For instance, it is present in the use of CD/DVD-Roms and the DVDs for education, commerce, tourism, the ecological and cultural patrimony of many cities, regions or countries of our planet, etc. As a side note, in our projects in this area, until now we have undertaken our research only with users without physical disabilities. We hope and wish to include a wider range of users to study hypermedia systems in our future research.

Along the evolutionary path of hypermedia, it can be said that it has become an interactive extension of multimedia. Consequently, this is the reason why the notion of multimedia is used indistinctly with that of hypermedia in many research works,

although the relationship between the signification and the significant may be not strictly symmetrical according to Ferdinand de Saussure [6]. In hypermedia the synchronism of the active and static and dynamic means is essential. Besides, the amount of interaction required by the system and control of the fruition of the user over the system are two quality criteria for making assessments in current hypermedia systems [7].

2.1 Communication, Information and Communicability

In the context of the factual and formal sciences there are plenty of theoretic and practical works which talk about communication [9]. In this research it is easy to observe several definitions, where there are common elements among them. However, the momentum of verbose communication in the daily and colloquial environment has generated a sort of deficiency in its scientific sense, that is to say, a terminological status is missing. This deficiency becomes even more obvious when we talk about communicability in multimedia systems. Therefore, we will try to rank different points of view on both notions. In the case of communications, inside the context of the social sciences and more specifically in the area of social communication, some experts traditionally made a study of the differences between communication and information (Abraham Moles, David Berlo, Frank Dance, Luka Brajnovic, Rau Birdwhistell, Wilbur Schramm, etc. [10]). Others, in contrast, exclude the notion of information. Currently in the design of interactive systems the word communication is linked to contents, that is to say, the communication of contents.

A short analysis of the word communication from its genesis leads us to the noun “communication” and the verb “communico”. Both have their origin in the word “communis” formed by cum (with) munis (duties-lins) [11], entailing implicitly the meaning to unite, to bind, to link to, that’s to say, there is a relationship with another person or system, in our case. There is an implicit dynamic process. For instance, through the relationship with the stored information in multimedia on-line and off-line systems, human beings can expand their knowledge. Regarding this, Schramm [6] considers communication as a real established relationship which consists in the discovery of the “I”, the “other” and “others”, and a donation of content which entails a duality of terms between emitter and receptor, who coexist in a contained environment and which is the foundation to its corresponding process. Within the notion of an emitter, we understand it to be the designer of multimedia systems, whereas the receptors are the potential users of that interactive system. Now, Schramm shows the need of cultural understanding between both to obtain optimal results in the communication process.

On his side Luka Brajnovic tells us about communication and information differentiating each one in the following way: “communication consists in getting in touch with two or more people, things or bodies, in their different combination possibilities and its meaning can be manifold, and have diverse procedures and effects” [10]. It is a sort of direct channel or creative encounter that ties presences and distances, sometimes, without the informational goal, although it can be a vehicle of information. Therefore, information can be included in communication. When the information is incorrect there is no feedback, in the interactive communication process, for instance, because human communication is a psychosocial process.

Moreover, if we consider that communication is a psychosocial phenomenon, we must admit that this phenomenon is a given in the human being with all his rational and creative possibilities to organize the message and interpret its reception. That is to say, that from the point of view of social communication, it is not a simple direct channel of relationships, but rather a socialization process.

Therefore, communication is a social fact, updated by the human being, through a process among which the integrants who make it up, where the interchange of experiences entails the enrichment of the participants, through the internalization of the messages that have been expressed in a given space and time. Among human beings there is a will to encounter in communications and a desire to have or create something in common. Spontaneous binding achieves the integration of man with nature, cultural patrimony, the community he inhabits, etc. We not only communicate data and facts but additionally we can communicate our ideas, experiences, feelings, and real or imaginary events, the objective and the subjective, the presence of two or more people in their different combinatory possibilities. Once we have quality in communication we are faced with the notion of communicability. That is to say, that communicability automatically includes quality. In our case, we sometimes use both notions simultaneously and redundantly to strengthen the idea of quality in the process of interactive communication.

However, communication and communicability are two synonymous terms in the current multimedia theoretical framework. In the design of interactive multimedia systems it is easy to detect the presence of communicability, although as happens with the notion of beauty, it requires time to describe each one of the elements that make it up. In short, it is starting from this interrelation “cum” technological and “cum” the individual when the relationship in other research environments take place, such as the cognitive models used in the development of interfaces. At the moment of the design of an interactive system, the designer must consider the cultural factors, the types of users, the geographical location of the system, etc. [12], [13], [14], [15]. These variables mean that since the software sector at the start of the nineties the need of incorporating sociologists, anthropologists and sociologists has been affirmed to improve the quality of interactive systems. However, in the new millennium it is necessary to talk of experts in communicability [7].

3 Empathy and Interaction: Interactive Design

We can define the empathy in the interactive design as the interactive systems designer's mental ability to put himself in the shoes of the potential user. It is the result of the triad confirmed by the cultural knowledge, mental ability to occupy the place of the other in the communicative process and the competence in advancing the user's behaviour in front of certain situations [16], [17]. In multimedia design traditionally we talk about cognitive models, that is to say, the solution would be to frame it in the psychological context. Obviously, it is a valid alternative for the first hypertext and multimedia systems in the late eighties and the decade of the nineties. With the advent of the use of information networks, whether it is Internet or extranet from international entities, since the late nineties it has been a matter of communicability. A communicability which stems from the design process in the

interactive systems and is translated to its usability. If we analyze some multimedia products aimed at the education of the nineties, we can find how in the design of their structure one resorts continuously to two quality attributes such as are prediction and self-evidence [16].

A priori, prediction and self-evidence can seem similar, but it is not so. In self-evidence, the navigation of pages with dynamic elements (i.e. audio, video, animation, etc.) and the structure of the system can be anticipated by the user from the first moment, even if the user has scarce experience in the use of hypermedia. On the contrary, in prediction the user must have previous ability in order to navigate efficiently and overpass complex situations, after having previously navigated the hypermedia system. In prediction there is more previous experience in the navigation or knowledge of structural parts. Nevertheless, in some hypermedia, where the designers resort to reusability of information, prediction and/or self-evidence can be prejudiced if the behaviour of the dynamic media is different according to the place that it has in the structure. For example, in some sites the user can interrupt the animation and go to another page of the structure, while in others he cannot do so until all the animation is finished [18].

These two attributes are related to the concept of isotopies inside the context of communication. That is to say, those elements that must be maintained continuously in each one of the design categories to favour the interaction of the users with the content of the multimedia system [18] [19]. For instance, the location itself of the navigation keys in the different screens. The same modes of activating and disactivating the dynamic means, the synchronization between the audio and the images in movement, regardless of whether they refer to a video or an animation, etc. The presence of the isotopies in the interactive design indicates a high degree of empathy towards the potential users.

In the first multimedia off-line systems it is observed a certain local or national empathy at the expense of international empathy. The reason of this failure in the internationalization of the multimedia contents lies in the fact that these systems counted with a design team for human factors, where would be located the empathy with psychologists and anthropologists. The origin of this deformation in communicative empathy and in the future of communicative evolution lies in software engineering.

Some authors in the nineties maintained that in order to increase the quality of the software it was necessary to include some representatives of the social sciences, referring only to psychologists and anthropologists [20]. Obviously, some commercial products of multimedia software have followed these rules but they have forgotten the social communicators, whose training is in many cases an intersection of the fact and social sciences. Before making these statements to increase the quality of the software it is necessary to know beforehand the university study plans which are usually different in each of the continents in our planet. It is through the social communication professionals that a bigger international empathy is reached, which makes easier the circulation of on-line multimedia content.

Throughout the history of interactive systems interfaces there have been some works that have made apparent the need to overcome cultural barriers among the different international users and the designer.

These works refer to the design categories presentation and content of the hypermedia systems. The acceptance of these premises of the interfaces design are related to the operative systems of the computers, that is to say, the interface and the PC Macintosh icons are not the same as compared with a PC that works with the last Windows version.

In this regard, the contribution made regarding compatibility matters, such as the meaning of icons, that has been undertaken by manufacturers of operating systems in order to increase the empathy and interactivity with the multimedia systems, should be praised. Although some icons and functionalities of these have changed in the last years, this does not mean that they are objects of criticism because from the point of view of their usability and communicability it is necessary to consider them from a diachronic view. To make an heuristic and synchronic study of these; without considering the temporal variable only mistaken results are obtained.

Making a diachronic study of the different interfaces used for the teaching of languages and those aimed at the virtual campuses, we can see how the interactivity increases during the teenage years in off-line systems, for instance. The interactivity with the system is related to the designer's empathy. It is for this reason that in the categories of presentation and content of the components of the interfaces for children we include the use of primary colors, sounds and melodies that draw the attention, characters from tv series, etc. [21] [2]. The more that the user's age increases, the designer will increasingly try to immerse him/her in real life situations to go deeper into the knowledge acquired in the learning process of a language.

The relationship between user and computer shows some variables during interaction [22]. These variables are related among the individual user, the interactive system, and the context. In the first case, we have to consider elements like age, physical condition for autonomy of interaction, education or previous experience with multimedia systems and the aims of fruition, above all. In the second case, we have to consider access to information and the kind of support for the information, basically. The last variable is the time to fruition through the use of an interactive system.

4 Lessons Learning

In the design process of a multimedia system the aim is to communicate content. Now, communication implies behaviour. Consequently, it is an activity that the designer develops with the purpose of obtaining a behaviour from other people through the information he has about the potential users. However, communication has a goal. This goal is flexible, since the very communicative process is modified, or rather, that goal is being determined progressively during communication. Therefore, communication does not only modify behaviour, but also the goal of the action to be communicated. That is why some of the quality attributes of a multimedia system refer to self-evidence, prediction, etc. The notion of wealth as a quality attribute is a solution that the designer has when he lacks enough information in front of the potential users of the system [23]. Nonetheless, that wealth entails a metamorphosis in the categories of navigation and structure of the system, that is to say to adapt the content and the ways of presenting the information in the interface of the computer

screen, iPod, E-Book, etc. in front of the eventual users, globalization and the future of standardization [24], [25], [26]. It is here where the ability of the designer is seen and his empathy, that is to say, the bigger is the experience the more you can see how the goals are being determined with regard to the options that are presented in a progressive way. In other words, the goal of the interactive communication must be adapted in a constant, progressive and detailed way, as the users' behaviour indicates a bigger interaction with the system's contents. Therefore, currently it is mistaken to set all the goals to be implemented at the beginning of a communicative process in a rigid way, for instance, eliminating the attribute of wealth or richness, whether it is via bidirectional navigation among the nodes of a referential link, activation or disactivation of dynamic means, etc. A parallel of this situation exists in the communication process in a classroom, when the teacher lays down the goals of a lesson at the beginning of the class. Although the goals are shown in a synthetic way, there must also exist the malleability of this order and/or contents with regard to the feedback inside the interaction process with the students [27], [28]. Therefore, communication always entails an action of a previous flow chart, where it is implicitly laid down that is intended to be obtained in the human computer interaction, for instance, repetition of the most frequent sentences in a language, overcoming the self-assessment tests, etc. that is to say, the fruition of the greatest possible amount of information stored in the database, explicitly, such as using the multimedia information to increase the cultural level of a student. In the next graphic some of the main goals are summarised, accompanied by interfaces where there is an excellent empathy towards the potential users of encyclopedia and English course.

In figures 1 and 3 we find the richness attribute and a menu of the options. The users can active or desactive the sounds, transition of the frames and dimension of the video, for example.

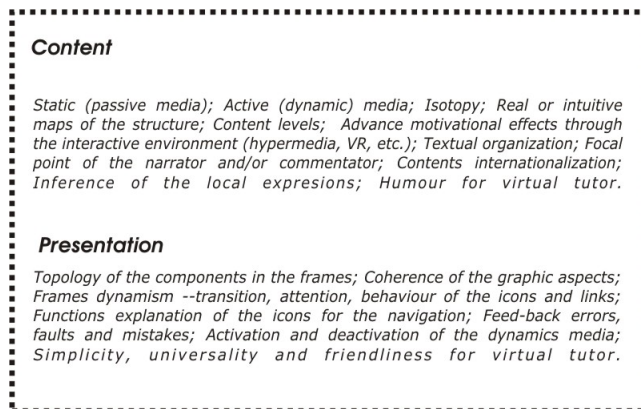


Fig. 1. Main empathy components in the design of interactive systems (content and presentation categories)

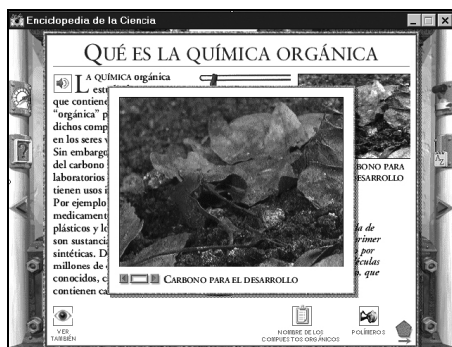


Fig. 2. Enciclopedia de la ciencia [29]



Fig. 3. Kiyeko –5 languages for children [30]

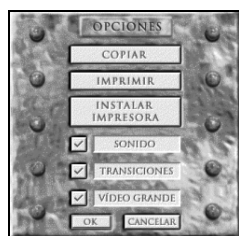


Fig. 4. Richness option

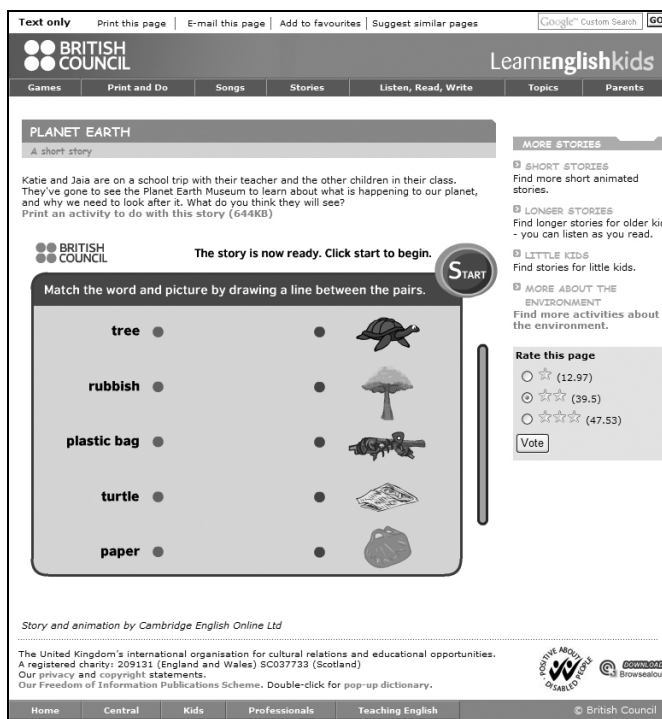


Fig. 5. Learning English Kids –www.britishcouncil.org/kidsenglish

5 Conclusions

The designer's empathy in face of potential users is the key issue for interactive systems of the following types –multimedia on-line, off-line, immersion multimedia, Web 3.0, virtual reality, etc. The current training of the designer and heuristic assessor

of interactive systems demands a real intersection of factual and social sciences. Besides, being a communicability expert is also necessary. That is to say, to reach an utmost quality in the design of interactive systems, in the least possible time and with reduced costs. That is why the communicability guide presented is a constructive addition to partially reaching that goal. We say partially because the current guide is aimed at users without physical disabilities, however it will extend and adapt itself to users with disabilities in the future. It is in the educational process that empathy gains a paramount role, since it is an essential element in boosting the motivation of potential users. Additionally, a good design of multimedia teaching materials with an excellent communicability level allows E-learning education to be offered not only inside the borders of a country, but also other adjacent countries or those who have a language in common. Consequently, empathy is an economic factor, whether it is because of the gains or losses which can pertain to the educative or industrial entity due to the generation of multimedia content. A way of detecting its presence or absence is through the users' satisfaction at the moment of interaction with the interactive systems. The intersection can be measured through the time spent on the websites or with the classical CD-ROMs or DVDs in the case of languages, for instance. The more interaction, the more communicability, and additionally it means there is a greater designer's empathy at the moment of designing the multimedia system.

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