Invited Papers

New hypotheses for the development of e-learning

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In spite of the great development that distance education has had during the twentieth century (of which learning through the web is the present trend), interpretative uncertainties still remain. To begin with, we are not even so sure that it is right to talk about distance education because certain solutions can take on different meanings according to the context and correspond to different functions in the teaching and learning process. This is particularly evident in the so-called blended teaching solutions, where the structural system puts together in an overall model (if, of course, this model exists) elements which were originally placed in the field of face-to-face leaning or of distance education.

The uncertainty derives from the lack of factors capable of conferring stability to an educational model to which the teaching solutions can be implicitly traced back. It is true that something similar can be said also about more habitual teaching solutions, such as those which are rooted in the European school tradition, but in this case the interpretation has ended up with being identified with behaviours, with the taking on of roles and with the carrying out of the functions assigned in the ambit of a social organisation.

The stability of the interpretations must not be confused with the rationality of the choices made. In the case of distance education, these interpretations are generally better defined, though without reducing the disadvantage for what concerns stability. In fact, also in presence of a weak theoretical knowledge of educational interpretations, there is a big difference between the definition of the educational task characterised by structural aspects and other definitions based on organisational and instrumental choices, whose duration in time is limited (and, what is more, is progressively decreasing). In order not to remain caught in marginal definitions, from now on the current distinction between face-to-face and distance education will be avoided: I think it preferable to replace expressions recalling contingent aspects of teaching practices with others referring to structural ones. However the teaching process may take place, the nodal point is the presence of interactions between a certain number of actors. We can therefore distinguish between direct interactive and mediated interactive teaching. These definitions are easily applicable also to mixed situations, in which the teaching plan includes both direct and mediated interactions.

It is evident that traditional teaching is essentially based on direct interaction and that distance solutions mainly rely on mediated interaction. Focussing on the diversity of the interaction favours common interpretations of educational problems, centred as they are on structural aspects and not on contingent solutions. Direct interaction certainly has the interpretative advantage of having accompanied for thousands of years the development of educational practices, becoming therefore an element of continuity. Instead, in the case of mediated interactive education attention has been given especially to the solutions which from time to time have made the mediation possible and to the fact that these solutions have rapidly changed over a period of time not particularly long. Apart from the experiences of a few precursors (e. g. J.-J. Rousseau's lessons on botany) the bases for starting mediated interactive teaching (that is the existence of solutions allowing mediation) were laid during the nineteenth century when the mail service improved thanks to the diffusion of the railway and to the simplified payments of mail delivery due to the introduction of stamps. In the twentieth century available solutions rapidly multiplied, but were also rapidly abandoned. The coming of new solutions determined strong emotional impacts, but the interpretations available to understand the implications of the innovations were often inadequate. In other words, the halo effect brought by ever more technological solutions was considered sufficient and no one asked what changes these innovations could have caused in the structure of the educational process. In short, there was a great development in mediated interactive teaching, but a far more modest development in the knowledge inherent to it. Research continued to consider mainly aspects of direct interaction, whereas mediated interaction teaching was to be seen as a less important

form of education[1].

Today the issues connected to the proper and to the common characteristics of the two kinds of interaction seem to be intersected with aspects of the development of education which need to be specifically interpreted. Among these aspects, the ones concerning the growth of the school systems in the developing countries are similar to what has already taken place in other areas of the world. School growth is hauled by a strong demand, which in turn is fed by positive expectations on the benefits that education can bring in terms of improvement of life conditions. It is more difficult to interpret other aspects. For example, the growth of formal education in the countries of European culture followed an idea of progress which was to come true only after the overcoming of illiteracy. The militaristic language used to indicate this intent gave the idea of a conquest, to be considered definitive, both for the individuals and for the social strata they belonged to. Today in the industrialised countries adult literacy is regressing, a phenomenon which is gradually increasing in spite of the considerable number of years of formal education during childhood and adolescence. Rationality in the educational offer is also diminishing, thus reflecting the changes taking place in popular culture and in social habits. Certain effects can be seen by everyone, starting from the poor learning levels in scientific and mathematical subjects. The reduction of rationality is accompanied by a consumerist mentality ruled by logics of temporary utility which, translated into cultural terms, means verbal slovenliness, superficiality, scarce motivation and so on.

It seems that two parallel debates have corresponded to the two forms of interaction. Many of the aspects just recalled are frequent in the current discussion on the choices to be made to make the offer of direct interaction education improve. Instead, the same aspects seem to be irrelevant in the case of mediated interactive education. In this second case the main focus is on technical and procedural solutions, whereas little attention is paid to the changes concerning the social, cultural and economic contexts that considerably modify the conditions in which education takes place.

The risk is that of an educational culture dominated by the two big aggregates of direct and mediated interactive education. It is the case, therefore, to recall some elements of the classic theory of educational systems[2] in order to identify the elements of continuity and those of difference.

Education is the transmission of knowledge from the older generations to the younger ones. This can happen implicitly, without a specific model (for

[1] There some exceptions, as the one represented by the studies of Otto Peters about the industrial character of distance education. Cfr. O. Peters, Distance education and industrial production: a comparative interpretation in outline, Hagen, Zentrales Institut für Fernstudienforschung - Central Institute for Distance Education Research, FernUniversität, 1976.

[2] The meaning of the word "system" is here rich of theoretical implications. See L. von Bertalanffy, General System theory: Foundations, Development, Applications, New York, George Braziller, 1968.

example, when one imitates traits and behaviours to follow another person), or explicitly. In the first case education is not separable from other experiences of life, while in the second case it is characterised by specialized forms (therefore it is named formal education). Some individuals then adopt these specialised forms: it is what is defined as the assumption of roles. The fundamental roles in a formal education activity are teaching and learning (role as teacher and role as learner). Only for simplification have these roles in the history of education been personally taken on by a teacher and a pupil. In the history of education there are, in fact, cases in which the role of teacher and that of learner have been collectively assumed, as Bettelheim pointed out considering education in the kibbutzim[3]. The contemporary organisation of teaching has favoured the progressive introduction of the division of the educational activities. In other words, the teaching role which in direct interaction was personal, is now shared by a certain number of people who collectively take on the responsibility to cater for the learning needs of the students. Something similar has taken place also in the field of mediated interactive education, where, however, the division of work corresponds to a stronger articulation of the tasks each member of the teaching group is asked to carry out.

TABLE 1:

Elements of a classic theory of educational systems

Assumption of roles
• teaching, learning
Social delegation
• The educational activity carried out by single individuals or by groups is based on a proxy to act conferred by society
Power of certification
• who certifies is accredited to do so because the certification is guaranteed by a higher organization
Standardized offer
• offering, at the same conditions, the same education in all the schools belonging to the same school system
Unit of space and time
• the subjects involved perform the same activities according to deliberate synchronous scansions

The assumption of roles would not be possible if the teaching and learning tasks were not founded on the wide recognition of the utility of formal education. Precisely from the recognition of such utility derives, in fact, the

[3] See Bruno Bettelheim, The Children of the Dream, 1969.

legitimacy of the educational activity performed by actors who are not connected to the students by family ties. The educational activity carried out by single individuals or by groups is based on a proxy to act conferred by society. At first this proxy was a consequence of the recognition of the particular characteristics of the actors; later on, the many qualities of the people and groups involved in the educational process made up the moral foundations on the basis of which to run the educational organisations. Parents who enrol their children in a given school can ignore who the teachers are, but they cannot – because it is a necessary condition for the working of the system – doubt that the educational organisation they are applying to is not accredited to perform the tasks required. This is the case of organisations offering both direct and mediated interactive education.

The assumption of roles and the social proxy are followed by the power of certification. Educational institutions have a public responsibility for the level of knowledge acquired by the students. This necessarily means that the certifying body is accredited to certify or that the certification is guaranteed by a higher organisation. In medieval times, the fame universities had acquired was sufficient for the recognition of the titles they issued. The addition of a guarantee by higher institutional bodies (the Papacy or the Empire) was a way of exercising political control on their activities. This additional guarantee proved appropriate with the increase in the number of students and of schools. It is not surprising that certification has become one of the issues the European Union is trying to face in the reorganisation of the school systems of the member states. Certifications capable of overcoming the limits of local realities and of offering clearly identifiable common references in the different countries belonging to the Union must be introduced. This problem exists for both direct and mediated interactive education. In the countries where the latter has become institutional (the Open University in the UK, the Cned in France, the Uned in Spain, the Uoc in Catalogna, the FernUniversität in Germany, the Nki in Norway and so on) the issue has been faced in a way which is similar to the revision of the certifications connected to third level studies occurring in conditions of direct interaction. The issue is more complicated in the case of non-institutional initiatives or of initiatives not aimed at meeting the local demand. In this case one hundred flowers can be seen blooming, all rigorously different from one another. The presence of clearly defined procedures of certification is the condition to prevent blossoms from rapidly withering, so that the most vital plants can grow and give fruit.

The growth of educational systems has been favoured a lot by the presence of a standardized offer. It consists in offering, at the same conditions, the same education in all the schools belonging to the same school system. This standardized offer has made it possible to impose cultural models which are not

socially conditioned, to overcome the obstacles connected to the geographical distribution of the population, to bypass the local linguistic barriers which frustrate communication. In short, the standardized offer has been, and is, an important dimension of educational rationality. There are those who identify the standardized offer as an expression of the control exercised by governments on education. In reality, this is not true, as clearly emerges from an historical analysis. Before the national States took over the systems of formal education, the differences between the cultural proposals of the schools of the various countries were far less than today. What is presently opposed to a good standardized offer is backward localism, in which folklore is the answer to involving cultural proposals. Another criticism to the standardized offer concerns the learning objectives, that for some people correspond to the credits attributed to the students. This is not a new topic, since it is continuously proposed by those who believe in containment policies concerning the development of education. Happily, the common sense expressed by such proposals has always revealed itself for what it really is, a complex of inferences fuelled by prejudice and which time succeeds in denying. The standardization of the proposal is a condition of rationality for education, however practiced.

To complete the identification of the elements on which the classic theory of school is based, the units of space and time must be considered. The unit of space consists in organising formal education so that all the subjects involved (beyond the role taken on by each person) find themselves close to each other and no technical solutions are required to establish interactions. The unit of time expresses a complementary need: in this case the subjects involved perform the same activities according to deliberate synchronous scansions.

What we should ask ourselves today is if the classic theory whose elements have just been recalled can still be considered a useful reference in a situation in which direct interactive education is more and more sided by mediated interactive education. We have seen that all the aspects considered can be interpreted with reference to the two ways of guaranteeing interaction with the only exception of the units of space and time. The spatial closeness and the synchronism of the activities are not constitutive elements of the theory, but organisational requisites, which can be ignored if there are alternatives. The actual development of communication technologies, ensuring growing opportunities of mediated interaction, has placed in the background the requisites of unity on which school education was based (and is based in the case of direct interactive activities).

The contribution of technology to education would be less precarious if it was considered in the light of general interpretative models. We must recall the definitions provided by Johan Clauberg in Logica vetus et nova (1652).

In the above mentioned book, Clauberg indicated to which questions we

should be able to give answers if we want to develop a way of teaching capable of answering to the learning needs of the students and to those emerging from the social and cultural context.

The questions made by Clauberg were the following:

- Quid sit tradendum et quo fine (What are the contents and the objectives of the teaching activity)
- Quis traditurus, quis accepturus (What are the characteristics of the teacher and the learner)
- Quomodo quid tradere conveniat (What are the operative solutions usable in teaching, already available or to be created).

To answer Clauberg's questions, an accurate analysis of all the aspects of education must be carried out, including those concerning the technical equipment we avail of. The availability of technological resources substantially modifies the answers to the three points in which Clauberg's thought on teaching is articulated. There is no doubt that both the contents and the objectives of education have changed. It is enough to notice how many aspects of the traditional educational offer have been abandoned while many others, once neglected or completely ignored, have now been adopted. Not only. The educational scenario today requires a revision of the choices to be made which consider the different cultural habits of the population (for example, one reads less for purposes of utility), the minor validity in time of the knowledge one has acquired, the increase of life expectancy, the necessity to update cultural and professional profiles. An answer to Clauberg's question which neglected the contribution of technology would be totally unrealistic.

Clauberg invites us then to consider the characteristics of those who teach and of those who learn. In a certain way, the pathway we should take is running in the opposite direction to the one we are used to. Before the educational proposal was prepared by a teacher and addressed to many students, while now this proposal is the result of a complex elaboration made with the contribution of various teachers, assisted by complicated devices, and which meets the needs of each single student (individualization of the learning process).

Clauberg is perfectly aware that there are no solutions capable of satisfying all needs, but that all the criteria of choice can only come from the careful analysis of the conditions in which we intervene. Technological solutions certainly represent a growing part of the quomodo tradere conveniat proclaimed by Clauberg. However, a generic reference to technological solutions is only a sign of interpretative weakness. Or, worse again, it reveals a substantially subaltern attitude in the educational field, because it is not backed by a specific elaboration. In the historical development of education teaching practices have always required the use of means which were effective only if they corresponded to specific needs. Indeed, it is the way in which the means have been

used, and not the means themselves, that has proved to be the condition for an increase in educational opportunities. A teaching culture capable of valorising the new opportunities as much as possible cannot but consider their characteristics with reference to the single functions of the teaching and the learning process. In order to overcome the tendency of not making distinctions, typical of the common way of seeing things, a preliminary analysis has to be carried out in favour of the identification of the specific needs that emerge from the context in which the educational process must take place. The analysis makes it possible, to not limit one's attention to the most noticeable and usual teaching functions (those on which common sense is based), such as the communication of the learning message or the evaluation of what one has learnt, but to consider functions which are often neglected or taken for granted. For example, why should a student be willing to learn what is proposed to him/her, no matter whether through direct or mediated interaction? And, the following question can only refer to the way in which it is possible to positively direct his/her affectivity toward the learning task. If we consider this particular function of the teaching activity, we can identify a number of solutions, each of them related to specific resources.

In other words, the design of a teaching plan derives from the identification of a problem and the allocation and use of resources depends upon such a plan. On the contrary, it often happens that only after ascertaining which technological resources are available, a decision is made on how to apply them. Or practices which have already been used in teaching are banally simulated without considering the opportunities of means (e.g. quick data processing and storing) in the view of an innovative educational design, from which new solutions could emerge in the field of assessment (both for tests and for the statistical analysis of oral examinations), in the consolidation of the knowledge acquired (since learning is quickly forgotten if it is not properly stabilized) or in adapting the message to each student's needs (individualizing the educational provision).

The Department of Educational Design (DiPED) of Roma Tre University[4] is currently implementing a research project whose aim is the definition of individualised strategies applied by technological data-processing systems only,. The starting point for the project was that in the field of e-learning,the teaching solutions adopted were often originally developed for direct interactions between teachers and students. The progress made is mainly due to the possibility of using new communication and information technologies. But in

[4] The am-learning (adaptive message learning) project was financed by the Italian Ministry of University under the Firb programme. There are two research units working with DiPED (project promoter): the Department of Medical Physio-patology of the University "La Sapienza" (coordinated by prof. Andrea Lenzi) and the Department of Social, Cognitive and Quantitative Science of the University of Modena and Reggio Emilia (coordinated by prof. Luciano Cecconi).

doing so, the validity of the proposals has been aligned with the development of these technologies, with little benefit for the quality of the message. The new opportunities offered by technology should not have destructive consequences on teaching innovation, pushing towards conservative solutions, although magnificently decorated with technological tools.

On the other hand, an analysis of the characteristics of the different solutions clearly shows that in time the constant concern in the development of distance education has been to increase the functionality of message communication. One could think that the communication of the message should not be a problem to deal with specifically in the educational sector, considering the totally new possibilities offered by web communication. But this is not the case. From the analysis of the main ways of using web technologies, what emerges is little more than a tendency to optimize the times of message exchange between students and distributing centres.

The obsession with communication, even if understandable, has moved to the background the need to analyse the educational processes. Mediated interactive education has limited itself to simulating the traditional relationship between teachers and students, paying too little attention to the elaboration of models capable of considering specifically the conditions in which teaching takes place. Today we have reached a good capability of transmitting texts, still images or in movement, workbooks and support materials. However, if we ask ourselves which of the solutions we make use of derives from the development of independent research and which is simply an adaptation of solutions developed in the ambit of direct interactive education, it is obvious that the latter are largely predominant. In other words, the effort to develop an autonomous research pathway in the field of mediated interactive teaching is still feeble.

The am-learning project aims at introducing innovative elements in the learning models, in the teaching strategies and the technological tools characterizing e-learning environments, moving attention from the reduction of the times of message transmission to the elaboration of the message in order to make it coherent with the learning requirements of the students. Therefore an overview is required of the scientific models and strategies which generate learning experiences characterised by:

a) solutions for estimating the student's capability of understanding the message during the learning process. The aim is to obtain a dynamic profile of the subject who is learning in order to adjust the teaching proposal to individual needs;

b) solutions for modulating the message, that is for transforming it from an undifferentiated formulation containing all the elements representing the learning object into a specific one adapted to the student's estimated profile;

c) solutions for regulating the learning "difficulties", based on the diffe-

rence between the necessary skills to understand the message as it was originally formulated (undifferentiated) and the skills effectively possessed by the student (estimated). Such solutions require the revision of strongly affirmed communication models, and which mostly derive from the choices made by mass communication systems, turning their logic upside down. The task is not, in fact, to make a linguistic simplification (lexical and syntactic) which also reduces the density of the concepts taught, but to establish compatible intervals between the language used for the formulation of the message and the linguistic repertoire already possessed by the student.

The creation and the development of automated solutions with the above described characteristics make it possible to obtain high-quality e-learning systems, whose goal is to optimize the learning process in order to help the entire group of students to reach the same objectives (individualization). This innovative strategy is based on the central role of the learner, and on the adaptation of the whole process to his/her characteristics.

In addition, the project aims to define an assessment kit for e-learning coherent with the needs expressed. It's an innovative tool kit, both because it is nearly entirely automated and because the judgement is inductively formulated (because it arises from the interactions taking place during the learning process), with a limited solicitation of the performances necessary for measuring the learning level. Inductive solutions able to follow the learning process by measuring the changes occurring in the students' profiles are being created and implemented. The use of inductive procedures has its advantages also for students' affectivity, since they are no longer required to make performances in which the process continuity is interrupted. The adaptive environment under creation is expected to be able to use this tool kit to continuously re-formulate the educational message in order to adjust it to the learner's needs. And this is true also for individual with special needs, be they caused by a physical or a social and cultural disadvantage.