A definition of criterions and methodologies for valuating the efficiency of multimedial products and of joint use of multimedial products and networks in Permanent Education

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In this work the results of a research are summarized aimed at a definition of criterions and methodologies for valuating the efficiency of online and offline multimedial products for permanent education. Through a theoretical analysis some criterions and references were pointed out for valuating the efficiency of teaching activities based on the use of new multimedial and telematic technologies, as well as the efficiency of the multimedial products themselves. Through an empirical investigation the research has then cleared up a set of attitudes and practical behaviours in persons who produce and use multimedial products in teaching, as well as users’ attitude twowards these products.

1. Introduction

In nowadays rapidly evolving economical context, permanent education is a major instrument to assure firm competitiveness and efficiency. A constantly accelerating technological progress, the economy globalization, and a significant reduction in technological cycles together with a parallel obsolescence in professional qualifications and deeper and wider socio-cultural contacts, require, indeed, a permanent update, from both a qualitative point of view and a quantitative point of view, which involves everybody.

Permanent education is therefore an irreplaceable means to exploit individual knowledge, achieve better results from technology investments, introduce organizational modifications.

The prospect which seems most interesting for the future is integrating more and more education in work, as well as work instruments and relations connected to work. From this point of view, firms, rather than with their products, material or immaterial, are to be indentified with the specific knowledge they integrate in their field. This knowledge is referred to present, past and prospects and instruments for the future. To describe the new ways of learning and the new processes and systems which can make it easier, a lot of new expressions were born, such as "open and flexible learning systems", "organizational learning", "active learning", "self-learning competency", "learning resource units", "technology based learning", "training on the job", "just in time learning" and so on. These expressions recover the idea of an education, linked to work, which can contribute to an organizational renovation and to the transformation of a traditional firm into a "learning organization", i.e. an organization "... where persons constantly expand their ability to achieve those results which they actually desire to, where new, productive thinking modes are born and developed, where everybody actively collaborates for a free circulation of the ideas and persons are constantly involved in learning how to learn together"3.

2. Research objectives and methodology
The research, promoted by Corep (Research and Permanent Education Consortium) and implemented at C.I.S.I. (Interdipartimental Centre of Computer Services), Turin University, was intended to define the basic criterions for valuating the efficiency of teaching activities performed by online and offline multimedial products, as well as the efficiency of the multimedial products themselves.

Starting from an analysis of literature related to this subject and carried out through a theoretical analysis, this research has pointed out a set of operational indications and a methodological trace showing criterions and references for valuating the efficiency of the teaching activities which use multimedial instruments for education, as well as the efficiency of the instruments which support the education itself. Such criterions should lead whoever produces, uses and purchases multimedial products for permanent education.

Then, through an empirical research, it was tried to check the actual guidances of the persons who produce and use multimedial products in teaching, as well as users’ attitude towards both these products and teaching paths during which they used them.

For data retrival, two tools were set up and tested: an interview grid for privileged interlocutors and a closed questionnaire for collecting courses attendants’ opinions. These tools were used, at training centres, firms and single users, to be tested, and in order to provide significant information in connection with the starting hypotheses.

The interviews were made with privileged witnesses, all operating at the vertix of firms producing multimedial software and/or managing educational processes, and were 14 on the whole. They also allowed focusing some crucial subjects which are to be taken into account in questionnaire compilation. Then 200 interview questionnaires were distributed to educational multimedial product users reached on indication of educational processes producers and/or managers. Only 43 questionnaires were compiled. This does not allow defining this a wide range investigation. It can be, on the contrary, defined as a study related to a few cases.

Most interviews and data collections have been performed on firms operating in Italy, particularly in Northern and Central Italy. Only one of them had multinational features.

3. Efficiency concept and criterions to valuate efficiency

The efficiency concept is taken back to the capability of a cause to generate a desired effect and, particularly, to the capability of an instrument to produce the results which it was built and used for. Therefore the efficiency concept implies a decided action, directed by clear objectives, using proper instruments to achieve a result which can be checked and measured.

Therefore, discussing about the efficiency of multimedial products and permanent education networks means valuating and measuring, from both a qualitative point of view and a quantitative point of view, the learning process, as well as the process by which the learning process itself was induced, in all its basic components, among which particularly relevant are the characteristics of used products and modes according to which such products were supplied.
A preliminary assumption for this research, which is, at the same time and at a certain extent, a prerequisite or postulate for its development, is the awareness that the efficiency of the teaching processes using technology, rather than the functionalities of the technologies used, must involve the capability of building teaching projects and paths which can best exploit these technologies. In other words, the technological instruments for information processing and communication must be considered as variables dependent on the educational process to be activated, while path and product efficiency is not immediately derived from the characteristics of the software or communication resources used, but from their connection to the project which has been built. The reasons of this postulate arise from the direct experience of the members of the research group and from many confirmations, which can be collected from the literature, to the fact that most online and offline educational multimedial implementations performed up to now are lacking in solid theoretical and methodological references at learning level and, on the contrary, seem to base, the research on the efficiency, on the opportunities offered by development environments and remote communication facilities.

Therefore, the difference must be pointed out between the efficiency of a teaching process and the efficiency of a multimedial product separately considered.

The efficiency of a teaching process implies observing a complex methodology having the following variables: teaching activity objectives; contents; persons involved; operational solutions and instruments used; context; valuation systems.

The efficiency of a multimedial product takes back, on the contrary, to its own characteristics and intrinsic qualities, as well as their connection to the characteristics of the persons who use, or should use, such product.

Therefore a teaching process and a multimedial product, with regard to an efficiency check, are referred to quite different indicators. Anyhow, although these indicators are quite different, they are not lacking in homogeneousness. Their main point of contact is represented by the persons who, with different qualifications, are involved in the teaching process. Particularly important, from this point of view, are the pupils.

A teaching process based on a significant use of information and communication technologies, both online and offline, requires a higher overall project level and a higher set up level than a traditional teaching process, as reduction of interpersonal communication and mediation of interaction by instruments require a greater attention to current variables. Teaching activity objectives, persons involved, contents and context where such activity will be performed are elements which must be thoroughly expressed and formalized. From them, indeed, besides the selection of the technological solutions and operational instruments, does arise a strategy definition for the communication process to use.

In teaching project central are the solutions adopted to solve the problem of the interactivity of multimedial applications and of the interaction between pupil and tutor and pupils between each other. To this purpose it is important, in designing both teaching paths and applications, to consider the processes which characterize a conversation in a learning environment, such as: a communication process, related to
the interaction between the multimedial information system
and the person using it, the latter being considered a sensorial and cognitive communication
transceiver system in which the intensity and quality of the interaction
provided by the systems is of central importance; a morphological process, identifying the strategies
of information organization and thereby the inside access and
orientation operational modes; a cognitive process, identifying possible correspondances and
isomorphies between the modes of logical structuring of knowledge
and the modes of analogical perception and conceptual networks processing by the user, about
whom algorythmic, euristic and talkative strategies can be set; a
teaching process, qualifying learning strategies by considering the intensity of personal initiative of
the pupil, and thus his autonomy with regard to information
material suggested, about whom a reactive, explorative or self-regulating methodology can be set5.

Also central in designing a teaching path are the valuation criterions of the teaching activity and the
instruments supporting it. A valuation means a connotation of
the analysis and interpretation of the information concerning all the aspects, steps, instruments and
results of a learning process. A valuation includes both a
measurement of the achievement rate of teaching project targets and a judgement on materials and
on the efficiency of path single steps.

Valuating a teaching process requires its steps to be constantly monitored. This requires using
procedures and tools for data collection, data analysis and data
interpretation to this purpose. For valuating the efficiency of educational paths, various valuation
types can be set, and particularly: a cumulative valuation type,
concerning the achievement of intermediate and final stated objectives related to a teaching activity,
temporally set at the end of the examined steps, and
significantly set at the end of the path; an educational valuation type, implying a regular monitoring
of every component of the educational process, in order to
improve and develop its efficiency; a diagnostical valuation type, concerning the pupils’ previous
knowledge and the characteristics of the context in which they
operate; a collaborational valuation type, originated by group reflections on the learning process;
single pupils self-valuation on the progresses and problems met
in their learning.

For valuating the multimedial material and the results of teaching Monomedia, Multimedia,
Ipermedia: The meaning of educational research, CSI-Piedmont,
Turin, 1991, p.122 process monitoring, collection tools can be used, based on: verbal protocols,
online protocols: performance measurements; questionnares
and interviews.

From the educational point of view, the efficiency of multimedial applications depends on: target
types to be reached; consistency between application
characteristics and targets; level of interaction which it induces between pupil and contents.

Rushby classification, suggesting four modes through which technical means can be used to support
learning processes, is an instrument suitable for the efficiency
valuation of multimedial applications from the educational point of view. This classification
introduces four categories. The instructional form aim is guiding the
pupils inside the subject being studied. It starts from the traditional lesson and develops its
characteristics. It is based on the methodological principles of
programmed instruction and on didactical principles of behaviourist type. Typical programs are the
"drill" programs and the "practice" programs. The former are lesson cycles joined to tests, while the latter are lesson cycles joined to test and reply systems.

Programs based on the revelatory form use a computer to simulate real situations or working environments where the pupil can experience the consequences of his decisions. Through simulation the student can be induced to discover theories which can help him to interpret and understand the cases he has been observing. From a general point of view the revelatory form allows students to get familiar with complex machines or situations, making experiences which are impossible or dangerous in other ways.

Applications based on the conjectural form allow pupils to use a computer to formulate and check their own hypotheses, in collaboration with other employees, with same tasks in different places.

The emancipatory form connotes the use of standard informatical and telematical programs for writing, calculation, simulation, filing, communication, documentation and remote collaboration.

The use of multimediality is relevant for programs based on the revelatory form and can contribute to programs based on the instructional form, as it can improve access pleasantness and reduce the impact with repetitive mechanisms which can cause boredom and abandonment. With the conjectural form, multimediality is not very important. On the contrary, the use of telematic resources is very important. Using informatics in the emancipatory form requires using standard application programs to which, step by step, multimediality was and will be extended more and more.

The efficiency of a multimedial product for permanent education depends more on its distinctive characteristics, which make it usable by the consignee, than on multimedial functions richness and spectacularity. The application usability is to be taken back to the fact that the application is: actually useful, i.e. it suggests, to the user, operations which are really necessary to his purposes; efficient, i.e. makes operations fast and simple; easy to learn; easy to remember; error-proof; nice to use.

Because developing a multimedial application is a complex matter, a project and production process is required based on severe, consistent and, most of all, explicit and valuable criterions.

Furthermore, previously defined elements are needed, such as: the professional roles which have to enter the development (project co-ordinator, teaching methodologies expert, communication expert, art director, designer, system analyst and multimedial technician, programmer/s, audio and video technicians, scope and contents issuing expert/s, editor); project co-ordination and management modes; a reference pattern which identifies the working steps foreseen; documentation procedures for performed work; modes of communicating between group members; support tools for single activities.
The multimedial application project requires that particular attention is mainly paid to two components: the hyperbase, both in its contents and organization, and the access structure, both as a separated interface and a set of navigation and orientation functions.

Designing the hyperbase is strictly connected to the design of a teaching path and requires that it is performed what follows: contents selection and definition; contents translation into a multimedial language; multimedial contents coding: multimedial contents spacial organization; multimedial contents temporal synchronization; interactivity rate definition.

Designing the access structure requires, on the contrary, that problems are faced connected to: ease to learn how the application works; ease to use the application; ease to retrieve information; teaching path personalization capabilities; disorientation and cognitive overload limitation.

4. Market characteristics and users’ attitude

The empirical research identified a set of practical attitudes and behaviours which help to understand the deep evolution affecting the field of information and communication-assisted education, as well as the constraints which derive from its historical evolution in our country.

The field of production of multimedial products for education, in Italy and particularly in the areas above considered, seems indeed to be mainly characterized by single production orders, a lack of a regular approach to customer requirements and, on purchaser’s side, an uneasiness in defining his own needs, which ranges from an attention paid more to the contents than to the teaching set up, to a disconnection between the set up, project and development time, and the end-user exploitation time.

This does not exclude, of course, that there are some firms which show a strong culture and great attention at teaching level. This is generally connected to a long firm history in the field of computer-aided education. Anyhow it is evident that most of the persons who perform this activity seem to be more interested in the technical and commercial aspects of the applications produced than in their efficiency.

A reason, which seems to be evident, of this fact is an underestimation, and often an absence, in the development of multimedial products for education by the firms, of two important events which characterize project set up and follow project termination: a diagnosis of end-user’s motivational aspects and starting conditions, and a final check of course outcome. This is ascribed to the fact that above steps are very long and expensive, and thus uneconomical, and that customer satisfaction, often already disclosed during project issue, or anyhow at product termination, is a sufficient index for product efficiency.

These attitudes actually show a still splitted market, characterized by a strong competition among very small to small-middle firms and many low price and low quality products, where the growing demand, generally, does not yet express clear needs and explicit requirements for the products.
A splitted offer, often of niche type, and a demand which is unable to request and valuate product quality, necessarily create a market which produces more and more, but, on the other hand, pays scarce attention to product quality and efficiency. In a market of this kind, the very fast development of technologies causes very strong consequences, because it conditions behaviour and directs the attention of both manufacturers and purchasers.

The users’ point of view confirms this scenario. Multimedial applications-aided permanent education is still seen as a marginal and occasional event in interviewe professional experience, with merely integrative purposes with regard to traditional education, and without an inherent, defined dimension.

On the other hand, because users know that this education type is connected to opportunities of increasing professionalism, they attribute a high value of personal investment to courses attendance, in contrast with firms which often underestimate this fact and attribute, to courses, short and middle term organizational purposes rather than long term strategical purposes.

Reminding, once again, that the collected sample does not represent the reference universe, but can work, at most, as a study related to a few cases, the reasons for which most customers state that they are satisfied with the courses can mainly be taken back to the contents that have been faced and investigated and to the opportunity to exploit them in their own working environment, rather than to product technical and interface aspects. On the other hand, users show to be aware of the importance of the fact that these applications should be easy to use, use a clear language and a clear structure, and effect a circulation of complete and mastered contents.

On the whole, manufacturers’ and users’ attitudes seem to share a substantial concreteness with regard to their own targets. This concreteness can also be considered a sign of a cultural limit which is still present in the collective valuation of the importance of permanent education and of information technology use in communication for its development.

5. References

2. Responsible of this research from the scientifical point of view is Luciano Gallino, Turin University, while the co-ordination was performed by Bruno Boniolo, Turin University. Participants to the group research have been: Barbara Bruschi, Laura Farinetti, Bruno Isetta, Fulvia Ortalda, Pierluigi Ossola, Claudio Scrizzi, Cristina Spadaro.
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