

E-Learning, Cause and Effect of the Balances and Unbalances in the Educational System Modernization

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Introduction

Everyone who attended to Conferences or Seminars specialized in "e-learning" had a little shock when they made the first contact with this dynamic environment:

- It was speaking in a different language, often using notions unknown to a "normal" teacher. And the maneuvering of these notions was done like it was about a "common" thing that everybody should know;
- The diversity of opinions was overwhelming, all the opinions were absolute; nobody stand for contradictions, each opinion was presented as "the only way";
- Different platforms, more and more special and original were presented, "crushing" other attempts in the field, that always were: limited, uncommunicative, poor-interactive, etc;
- Although the idea of "pedagogy" was used and its fundamental principles were mentioned often enough, many of the things that were presented didn't respect its classic notions and principles of actions;
- In this "sea", in this "soup" of platforms, software, languages, and the teacher - the central figure of the educational system - seemed vanished. It was created the impression that in modernized educational system, a computer and a platform, well thought, make everything;
- The students' opinion was seldom mentioned, who were in fact the first beneficiary of these efforts. But, when a "final" sentence about another alternative was needed, the argument "... neither the students received it with enthusiasm" was used, argument that was also used in the other sense, when somebody wanted to confer qualities to the proposed method.

Of course we've exaggerated a little bit in the above presentation, but we are convinced that many readers of the present point of view admitted, more or less, their sensations and feelings felt at the first contact with this environment.

Would the "e-learning" be the way of modernizing the educational system?

Would the ODL (Open and Distance Learning) be the "hole" that will swallow the present educational system?

Our point of view

The revolution proposed to worldwide scale through this quasi-unlimited Internet product, compared by many sociologists as being the equal in importance and impact to the one produced by Gutenberg with his printing, cannot be neglected by the educational systems, regardless their rank (primary, secondary, university).

The transfer of this "wave of knowledge" in the field of education means, of course, important modifications in pedagogy. Unfortunately, the electronic revolution was quicker than the reaction of the specialists in pedagogy and sociology, so, this remaining behind, or otherwise said, "the lack of reaction", was the first that generated conceptual contradictions.

The second generator of conceptual contradictions was the group (more and more wide) of teachers, which began, on their own or in a team, to develop and to propose ways to implement e-learning in the daily didactic act, being very enthusiastic about the transfer of, and access to information, due to the huge horizon opened by the appearance of the "WWW". Every teacher knew a platform better, everyone preferred certain software and so, a diversity of opinions about **the best way**, was created. The known way is recommended- evidence that can't be denied by any pioneer of e-learning.

The action wasn't just a desire of this group, but it was the adequate solution to an objective necessity. The educational market for youth (the only one who generated and justified the didactic act, for a long time) was joined more and more pressing by the **adults market**. Continue learning started to be a social request, more and more acute and many fields and specializations felt the need to update their knowledge. The graduation diploma wasn't any longer a warranty until retirement, but it needed to be completed periodical at first and continuously later, in order that the adults could deal with the economy requests which embedded with rapidity the technical and technological news, often quicker than the adapting of the educational system. For adults the suited way of continue learning is the ODL, which should use more and more the e-learning because it addresses to people who produce, have children and families to support, but they don't want to be left out of the work market due to their impossibility to adapt to the new requests for specialization.

It is true what philosophers say: "...**the necessity makes way through random occurrences**", but

this "diffuse and divers layer", created by the efforts of the ones who took charge of creating e-learning, was harder or less contested by two important groups of participants to the didactic process:

- **by the teachers** who remaining to the "**classic way**" of teaching, sometimes improved by folium, Power Point or other presentations based on multimedia and who, suddenly, felt in the danger of not be able to adapt to all notions that, the promoters of e-learning, were launching in a quasi-mad rhythm "at any price". In addition to that, this group lets name it "**conservatory**", maneuvered a well précised area of knowledge, in which they dwelt and in which they could create the image of competence in contact with the students to whom they transferred these knowledge. They also could add new knowledge to their personal luggage of competence in the rhythm imposed by the editorials appearance and not in the rhythm of informational explosion produced by the Internet;
- **by the students** who were used: to look up in books uncontested truths, to reach the information under permanent guidance of teachers, have suddenly found themselves facing the necessity of learning, almost for each electronic provided subject, another platform, another software, another interactive system.

Over these subjective reactions, the commercial ones have superposed. The Internet connections cost, the access to valuable sources of information is coded and conditioned by money, the nets are overloaded and, as a consequence, the access speed is prohibitive and time consumer. It is easier, much time, to take a book from library than from Internet.

At an attentive look, all the presented reactions are perfectly natural and justified.

And then???

Our point of view is that there are fundamental errors of **PEDAGOGIC** approaching:

E-learning isn't a new method of teaching, BUT IT IS AN INSTRUMENT!!!

As the printed book was and it is an instrument of small volume, merchantable, revisable, perfectible, destined for dissemination of information of any kind, just like that e-learning **must be regarded as an instrument for dissemination**. THE DISSEMINATION SCALE became "WORLDWIDE", due to the connection of this instrument to the Internet, and as a consequence, it is NORMAL not to exist a "single language", "a single platform", "and a single way of approaching".

The printing might be the same in principle, the paper might be the same, the ink might be the same... but the language could be different. Nowadays, over the "linguistic" differences are overlapped differences of platforms, of software, of concept...

If you wanted the information contained in a Japanese book, you would translate it. Nowadays, if you want to have access to an e-learning system, you must learn it and, in addition to that, you must pass the linguistic barrier, which is not broken by e-learning. The similitude is so strong that it has to be accepted. There will never be a single system for e-learning. We are not allow from the linguistic limits, from the ones due to the social and economic development, form the ones due to the development regarding computer science, from the ones of methodical and didactical technology. But we can have access to such a powerful INSTRUMENT, that the revolution of the educational system should mean in fact another qualitative step produced by the huge amount of information to which both the teacher and the students have access.

Balance

The system of e-learning produces equilibrium if it is withdrawn from the category of "**teaching methods**" (which, in fact, launched it on the market) and it is accepted as an "**informative instrument**".

This angle of approaching **creates equilibrium**. We should keep the actual methodology in the direct didactic activity with the students, adding to it all the facilities given by multimedia and attach to it this powerful instrument of inform which is e-learning. For continue education e-learning is at the same time didactical support and support for information, but the generalization of teaching with electronic platforms leads at unbalances.

Unbalances

The educational system **needs the teacher!** The teacher is a "**model**", a model for science activity, a model for didactic attitude, an ethical model, and a social model. **IT CANNOT BE REPLACED BY A COMPUTER** (or by a network of computers) **AND BY A SOFTWARE, HOWEVER STRONG MIGHT IT BE.**

The replacement of teachers with a system in the network is the direct result of the idea that through e-learning we revolutionized the teaching system. WRONG! The education - having the teacher as the main actor - cooperating with the students, advising them, guiding them - will still remain a firm pedagogic principle. Lets argument. Education has two fundamental sides: **an informative one and a formative one**. For the FORMATIVE one, the teacher is the only way. The forming is a social action of contact with

different environments and models, an action of direct communication, of debating and personal affirmation.

None of these actions can be assumed by a computer or by software. But, the other side of the education, the INFORMATIVE one, YES! The e-learning INSTRUMENT is in fact the most powerful way of stocking and delivering the information in the network, without the known limits of the magazines, books and libraries, but it has its own limits. It makes the teachers to outrun their biological limits, adding to them some kind of "external memory" to which there is permanent access and actualization, through collective effort at worldwide scale, besides the gestures from the teacher's desk.

Any abdication from the principles and precepts mentioned above would cause strong **unbalances** in the didactic act.

The bold description from the beginning of this material was, in fact, a succinct view of the unbalances already created by the understanding of e-learning as a way of teaching.

Changing the concept of inform

E-learning will produce essential modifications to the concept of information transfer.

The book was a similar object on all meridians, also the pages, covers, printing and information structure in author's view. The limits were the price, language and copyright.

E-learning brings in common for users only the "way of accessing". The form, the interactivity, the language of programming, etc. are the contribution of the ones who conceive the way of the information transmission. The access to this kind of information no longer depends only on the price and language, but also on the solicited informational level, on the price for accessing, on the quantity of information that could be transferred using the available server, on the speed of the network at a moment, etc. So, besides the limits of informing using books, the limits of the informational system have been added, supposing that the users should have the same knowledge and skills (an obvious aim, but we don't want to speak about these personal limits yet). It is obvious that the increasing number of restrictions leads to unbalances in the system, while the reticence about e-learning is sustained by strong arguments.

What is to be done?

Just as until now, the teachers were accessing the information in a field (books, magazines, catalogues, etc.) and transposed it in a synthesis called "COURSE" which was underlining its role in the act of the students informing, nowadays, THE TEACHER must STILL be the personage who collects, filters and synthesizes the information that the www give as in a huge volume. That is why we said that the central personage-the teacher- mustn't, but can't become an annex of an electronic system.

There will be voices that will deny the possibility and necessity showed above, invoking the natural limits in the teachers' knowledge about software.

There is nothing more false!

Let's think a little bit "without hate and partiality". The teacher's books were "made" by publishing and printing houses. He only offered the written material, as the result of its personal, or of a group, work of information, selection and synthesis. Why should we cancel now the role of publishing and printing houses as institutions involved in the process of informing, only because everyone could stay in front of the computer and access information?

If we think that the e-learning, when it modifies the concept of informing due to its specific, will modify and the concept of publishing and printing houses, aligning them to its requests, then we will see that the teacher keeps its natural position in the informational process. The task of decoding the diversity of platforms, the diversity of used software, and the linguistic diversity came to some teams that will join with the actual functions accepted for the publishing and printing houses tandem (that will remain useful and necessary for many years from now on). So, there will be created specialized teams in e-learning (software and multimedia) for both directions: decoding the information given by the Internet network or by the coded channels and the introduction of information given by the teacher as a result of selection and synthesis on e-learning formats, generalized or not, by the higher educational institution to which they belong. To these teams of specialists in computer science, there will be added specialists in multimedia who will interfere to make the information to be more accessible, more didactical and more intuitive. The actions won't limit the teacher and students access to the worldwide network of e-learning platforms (not even today the students and teachers are limited in using the information on paper support. There are other limits to this access).

There is how, if e-learning is considered to be an INSTRUMENT, the things will lay in their rightful place, the changes are produced at an institutional level by adding new valences to the classic ones and the teacher keeps its role even he knows or he doesn't know "to make" e-learning platforms. He remains the element of synthesis, the transmitter of information, the user of platforms at the same level as the students without changing in a personage without face, hidden behind a computer, presented only in his web page in a resume.

Changes in didactic information structuring

There are some things that must be changed in the concept of structuring with a didactic aim of information. Today, the students have at their disposal some information from books or magazines from libraries that they access when recommended, or when they have the necessity of solving some applications (projects, home works, etc.) or by curiosity or by the desire of supplementary information. At this type of information it is added information structured with a didactic purpose, represented by the teacher's course, lab guide, guide of projection.

Both sources of information suffer drastic modifications due e-learning:

The first source progresses from the limits of a library (or many) to an access to worldwide scale at a written book electronic stocked.

The second source, because of the facilities given by e-learning, determines the teacher to make some changes in the concept of the didactic materials structuring that he creates.

Without having the demand that we offer an exhaustive solution we bring in your attention a concept of didactic structuring that we have been working on and that has been proved its valences in a short time. Here, sure there can't be given any recipe especially that we are the partisans of the idea that the teacher is a model that, in his effort of knowledge transfer, automatically becomes a formative model, too. Every teacher will make the didactic structure of information transmission in his own style and concept. We only offer an example of approaching at the preparing of a complete course for an e-learning platform, with direct referring to engineering.

The first step of information must be PHENOMENOLOGICAL. The engineer, who makes palpable, concrete things, must know the fundamental phenomena not only through equations and descriptions, but he must reach out to imagistic representations. This step is the one that must use ANIMATION, FILM and PHOTOGRAFY as systems for explaining the phenomena even if the phenomena are hard to represent and imagine. This is the area in which the multimedia means are raised to a level of obligation in didactic methodology. For example, we have succeeded, although the lessons that we were working on were referring to Thermodynamics, to animate the concept of rotor, which produced many reactions of rejection among the students, in the stage of understanding the phenomena. Our surprise was that this intuitive form of the rotor has raised with over 90% the degree of understanding of an arid part of the theoretic explanations. Here, the teacher's role is essential and overwhelming. Think about the different forms of intuitive description, animated or otherwise, of a complex phenomenon that could exist. Think that the students will have access to all due to the Internet and e-learning platforms. The results almost cannot be quantified in this stage of defining, but it can be suspected that they will be extraordinary. A Romanian could know the way in which the phenomenon of thermal convection it is presented at a University in USA and if he thinks that it is insufficient or unconvincing, he informs himself in U.K., in France or in Japan. Everything is that the idea of the first stage of phenomenological information should be accepted at as many schools as possible. The ways will surely be very divers and extremely profitable.

The ones who have a certain experience in the field have noticed, we believe, a potential "danger" among the praised advantages. The teacher will be permanently compared and evaluated. It will appear, as necessary, the didactic cooperation at a geographic level as wide as possible. It will appear schools that maneuver similar concepts. There isn't much to predict at this stage of evaluation, so we are limited only to this.

The second stage of information is that of passing from the phenomenon to its mathematic description. Lets call it MATHEMATIZING-ALGORITHMIZING. Here, the teacher is the decisive element, too. Because the level of **mathematization** of processes and phenomena differs from country to country, or even from university to university, this stage must be well sustained by links, when it is restructured. The hypertext becomes quasi-compulsory, in order that the student could complete its knowledge about: the used notions, previous demonstrations, the history of discoveries in the field, variants described with simplifying hypothesis, more or less empiric approaches verified by practice of the mathematically treated subject, fundamental notions of superior Mathematics to remember, or notions of Physics, Chemistry, etc., in direct connection with the mathematical description made in the material synthesized by the teacher. Unlike the text of base, it must offer to the reader all connected notions to the subject, no matter that they belong to diverse fields or there is the assumption that they would be more or less accessed. The analytic calculus is combined with the numeric one (very fashionable since the introduction of computers and highly used in the case of complex process who doesn't admit analytical solutions).

It will appeal to methods of modeling because, always, the reality cannot be transposed in mathematical formula without some kind of simplification. It is important that this stage should form the student as a well connoisseur of the instruments of passing from the phenomenon to its modeling (once again we precise the orientation to the engineering requests of the present material).

The third stage of information is the one of APPLICATIONS FOR CALCULUS. An engineer who doesn't know how to move on from theory to applicative calculus is incomplete formed. From now on, the applications, the examples of calculations will be in the network. The school platform can select, through the teacher, the access to other sites, which are liked because they come to complete one's own effort for applicative instruction. How well will the student enter in the world of applications! How useful will be for

the teacher to construct an image of "what it is being done in other corners of the world" in this field of informing, so he wouldn't be in the situation to repeat already existing problems or home works, offering to the students the possibility to copy instead of create, is a field that can be discussed separately. Anyhow, the numeric calculus and the afferent software are, in our vision, the main subject of this stage of informing.

The fourth stage of information is the LAB. We don't insist upon its role in students' forming as future engineers, because we know that here the opinions are in consensus at worldwide scale. But, we should make an appreciation regarding the engineering position in the actual ODL concept. The most of the specializations that embraced the system of Open and Distance Learning were the ones of purely university type, the ones that only requires teaching and seminars. The lab was the main brake in applying the ODL in engineering. The most important obstacle was and it is the impossibility of assuring lab experiences using e-learning methodology. In the last period the concept of "virtual lab" was defined as a step forward in solving this necessity. The concept included the endowing of the virtual lab with powerful software for measuring, data acquisition and process control, software for virtual reality and Internet connection of "virtual campus" type. Our experience, presented at the Conferences from TICE 2000 - France and ICL - Villach - Austria - 2001, was of including in the "virtual lab" of Lab VIEW, software from the market, as an instrument for constructing the e-learning platform. This software assures virtual instrumentation, data acquisition and process control, has the connection to the Internet assured by the National Instruments and there are several experiments at distance that can be conducted in real time. What is the news that our concept brings? The students can learn the data acquisition, the measuring of physic, mechanics, thermal, etc. parameters using the computer as an virtual instrument, the process control and, very important, based on some protocols of cooperating in the didactic field, the didactic lab experiments can be repeated from any university in the world to any other university in the world and the control of measuring the parameters can be made at distance in real time. Let's think about what extraordinary power offers the idea. Nowadays, the students have at their disposal a more or less classic, more or less modern endowed lab (especially in the ex-socialist countries and in the third level countries). They can complete their knowledge, and go in documentation or research at other universities, but not everybody can have this advantage because of many organizational motives and because of the prices. An Internet connection and the conception of the papers in the system of the Lab VIEW graphic language, in common agreement between universities, will make possible that a student have at his disposal every lab paper (of course that this assertion is realized at the limit of worldwide acceptance) from all similar universities in the country or in the world. The experimental base becomes huge and the preparation will be adequate. It is encouraged the cooperation in organizing the labs, in the conception of papers, and the **complementarities** becomes a quality and not a limitation. Here is how, by a well choosing of the qualities of software, without needing a platform especially created for the virtual lab, the limitations due to labs, at the introduction of the ODL system in the engineering, can be transformed in an enormous advantage. Only the cooperation is necessary. We don't discuss about the financial advantage of the things presented above, although they shouldn't be neglected. Countries that have limited possibilities to endow their educational system can have access to experiments that neither in 10 nor 20 years they could have money to install. And the students will have in time the same experimental base, a very easy way to create the concept about that today we only speak of which is that of: EUROPEAN ENGINEER.

Conclusions

This is a point of view came from a country which is at the beginning of introducing e-learning in the higher educational system. But we have a large base of information (France, Spain, Germany, Swede, U.K., and Ireland) which made it easier for us to synthesize a concept. We also have an experience in preparing the e-learning platforms for the engineering educational system, with prevalence for the phenomenological stage (Prof. Dr. Ing. N. Vestemean) and for the "virtual laboratory" stage (Prof. Dr. Phys. D. Ursutiu and Prof. Dr. Ing. C. Samoila) communicated at some Conferences of European prestige.

We consider our point of view a platform for discussion and reciprocal change of opinions, because all the aspects of such a dynamic and large system, as it is the e-learning, cannot be resolved in a single article, even if it represents the synthesis of worldwide scale experiences.

We are conscious that the main quality of the ones that was involved and will be involved in this field must be the FLEXIBILITY and ADAPTABILITY.

The rigid and exclusivist positions will filter themselves through the loop of the sieve, today called www. The important thing is that we should be careful that, at any progress in the field, we analyze open and with sincerity the balances and especially the unbalances produced, and act in the sense of negative effects minimization. And the most important gain in action remains, for us the teachers, the idea that **ONLY THROUGH COOPERATION, THE POTENTIAL VALENCES OF A WAY THAT IT IS AT THE BEGINNING CAN BE VALORIFIED AT MAXIMUM.**

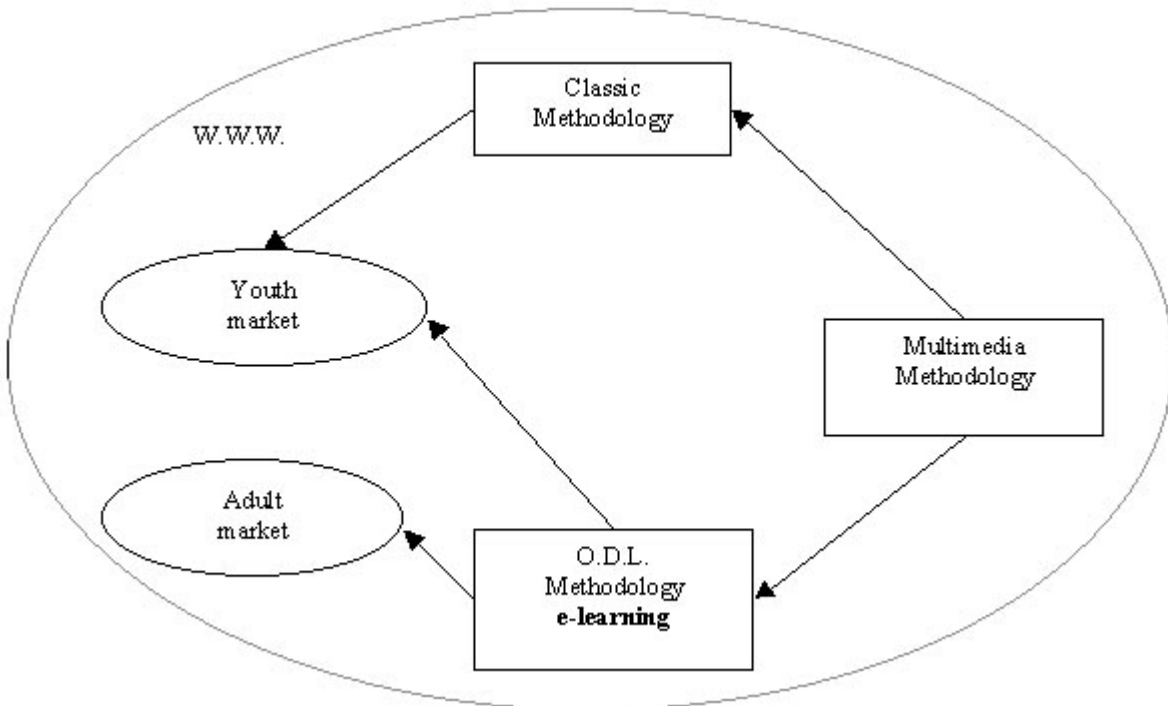


Fig. 1. Actually correlation between teaching methodologies, learning markets and Internet

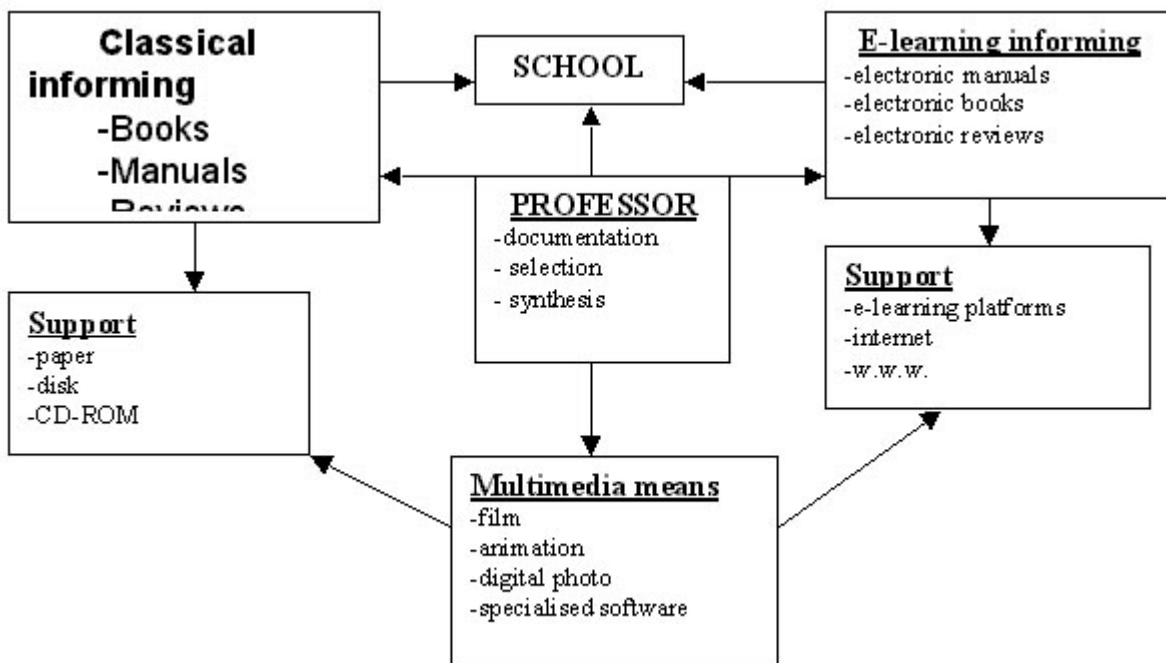


Fig.2. Interactivity in information offers

	QUALITIES	LIMITS
BOOKS	<ul style="list-style-type: none"> -small volume -merchantable -review able -perfectible -reproducible 	<ul style="list-style-type: none"> -costs -exhaustible -regional influence -linguistics limit -limited dissemination scale -copyright -unanimable -slow

		connexion
E-LEARNING PLATFORMS	<ul style="list-style-type: none"> -world dissemination -pyramidal source of information -reproducibility at low prices -access at huge quantity of information's for professors and for students in the mean time 	<ul style="list-style-type: none"> -too many languages -too many platforms -too many software -speed of transfer -prices for connection -slow network -overtax network -valuable sources are codify and payable

Fig. 3. Limits and qualities of classically and e-learning information's sources

Nr.	PHASE NAME	STYLE	SUPPORT
Phase I	PHENOMENOLOGY (understanding)	<ul style="list-style-type: none"> -animation -movies -simulations -design -photos 	<ul style="list-style-type: none"> -multimedia software -virtual simulators
Phase II	MATHEMATIZING-ALGORITHMIZING (theory)	<ul style="list-style-type: none"> -mathematic demonstrations -modeling -numerical calculus 	<ul style="list-style-type: none"> -hypertext with all of needed information
Phase III	CALCULUS and APLICATIONS (theory-application connection)	<ul style="list-style-type: none"> -simplifying hypothesis -basic calculus for design -particular calculus of design 	<ul style="list-style-type: none"> -problems portfolio -design portfolio
Phase IV	a.- LABORATOR (experiment)	<ul style="list-style-type: none"> -data acquisition -data processing -process control -instrumentation (real and virtual) 	<ul style="list-style-type: none"> -LabVIEW -other software with orientated destination
	b.- PROJECTS (individual creation)	<ul style="list-style-type: none"> -projects reproduction -new projects -ideas competition 	<ul style="list-style-type: none"> -projects portfolio

Fig. 4. Information structure in the proposed concept of e-learning

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