

NEW EUROPEAN VIEW OF EDUCATION

IMPLEMENTATION OF ICT IN OVERALL EDUCATION PROCESS: SCOPES AND LIMITATIONS

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Educational Programs based on Information and Communication Technologies (ICT) contribute to the quality of education and training and to Europe's move to a knowledge based society.

The European Commission has been very active in supporting and complementing the efforts of EU Member States in this field. The Leonardo da Vinci Program is a part from the efforts implementing the e-learning Initiative and Action Plan in operation through different measures (pilot projects, transnational networks, etc.). This way it has gained considerable experience in encouraging cooperation, networking and exchange of good practices at European level. Introduction of e-learning approach is a further step towards realization the vision of technology serving lifelong learning. It focuses on a set of actions in high priority area, such as Biotechnology and Public Health, chosen for their strategic relevance to the modernization of Europe's education and training system. The infiltration of new communication and information technologies of education and training requires **standards** to be set and roles and teaching methods to be redesigned in order to receive better benefit from the opportunities offered by technological information. Teaching approaches have to be furnished with a **user centered approach** in order to be pedagogically effective. Thus, integration and support of lifelong education and professional training without emphasizing a negative impact on learners' individual development and its projection in society could be achieved. The implementation of ICT approach for realization of virtual learning gives an opportunity for use the results from rapid evolution of science and technology into education. The analysis of European general scenario of education gives the following aspects, characterizing the common trends:

- establishing criteria for selecting 'good' practices;
- implementing changes in education;
- organizing ICT based-learning system.

The integration of the requirements of the 'information society' into educational system is linked with the following features:

- Methodological: the used didactic tools must be user-oriented and the applied solutions must support the usability of multimedia tools;
- Pedagogical: providers of the teaching process (teachers/trainers) are engaged to play a key role in tele-education

in order to guarantee qualitative pedagogical content of multimedia tools. The advantages and limitations of virtual reality are based on learning at experimental level;

- Qualitative: strongly useful is the adoption of procedures and rules for validation of quality and applicability of multimedia teaching product;
- Societal: distance learning benefits also the disadvantaged people to access education.

The new strategy of European education

The policies for the implementation of ICT into education can be either 'strategic', by creating favourable conditions through public awareness, legal facilitation, etc., or 'operational' comprising specific work and development. Thus, the policies can address:

- Supply supporting; content development; models of innovative learning offers creation; pilot testing or rising awareness.
- Demand supporting: availability of educational technology;
- Infrastructure supporting: creation of suitable level of equipment and facilities for use of ICT.

The new policy concerns on the first place the learning pattern, then the teaching model. This approach is focused on learners and allows them to play an active role by building, in accordance with their personal learning action plan, the knowledge and training pathway best to their own place and style.

All this creates a new policy where learning is not confined essentially to school years. *Vice versa*, the necessity of knowledge and training comprises a whole lifespan (lifelong learning) both at professional and individual level.

The telematics application is meaningful, proper and necessary due to several factors: the expert/teacher individuality; the distance between teacher and student; the high number of people that can use the proposed information; the need to learn in accordance with different times and locations.

One of the main goals of such educational programs is to create that kind of **learning cycle**. These tools made up of class and teacher, located or not in the same place, create community

effects complementing each other into a virtual society with high efficiency.

The early created spectrum of learning opportunities makes the time and place without importance as the teledidactic is available to users anytime and any place they need it. This way the results are disseminated to non-limited number of potential users as well as to weaker and more discriminated ones who also receive this opportunity.

All this outlines the considerable social and economic impact of advanced communication technology in distance learning field, especially in combating with:

- Early leaving of school causing unemployment of young people;
- Discrimination of women in social and professional space;
- The lack of optimization of continuous process of on-site training and retraining – especially in SMEs playing a driving role in national economy.

This way an implementation of advanced technology and competitiveness of work power at international market is reached. e-Teledidactics makes learning more widely accessible and moves the center out of the classroom to a virtual learning space.

Advanced teaching: a methodology approach

Application of telematics in education and training requires respective changes in methodology for planning and tutors' role.

Lack of application of advanced technology in the school structure leads to appearance of negative trends, which need to be changed in a short time. Otherwise, the school will lose its driving role in social development.

The situation, in which the school can be a conductor of technological literacy, cannot be overcome only by equipping it with computers. It is necessary the whole didactic to be rearchitected, as well as the teaching/learning pattern to be renewed. This approach will change the role of teachers, who during their education mission transfer objective knowledge, into learners' collaborators. They will act in the process of discovery and revealing of new horizons, thus leading to the construction of dynamic knowledge. As well as they will act as guides for the achievement of an individual learning method. New teaching player appeared – the mentor with the mission to be in charge of the individual support and encouragement of the student but not to propose him/her the trace direction.

In order to answer the needs of users for introduction of multimedia teaching, both at school and training levels, the following key points should be noted:

- Didactic products and tools should be designed on the basis of **user – centered model** in order to be pedagogically effective.
- Implementation of teaching and training operator's facilities in the process of design of multimedia teaching – support tools. In this way the learning path lasting

from general education to professional training will be extended to retraining in special skills and even to the reconversion imposed by technological development and innovation. Thus, as the general education is providing basis for vocational skills, the vocational training process should continue the development of basic competences acquired before.

Quality assurance of the ICT based products

Recently, a considerable delay in implementation of telematics in educational structure in comparison with the abundant multimedia tools occurred. In accordance with the needs of validation of these products at EU level, two main considerations are outlined:

- The establishment of rules and standards for evaluation and validation methodology for multimedia products; formulation of rules for usability, scientific and didactic content.
- The elaboration of certification standards for multimedia products in relation to the EU directives and set up these products into teaching/training process.

In order to verify the validity of the product/s a label certifying that should be included. This will orient the end users.

Implementation of standard definitions in use of ICT technology

The vast amount of image – processing software creates a risk of crowding the users. At that moment it is not possible a direct and unique interpretation of icons to be applied. But the increasing widespread of the use of some operating systems and network navigators is becoming a real standard. The next step will be to develop the necessary research and to make a proposal in order to ensure the Europe's engagement for adoption and realization of a universal icon presentation standard. To reduce learning time and to facilitate the transition from one product to another a definition of a standard link, access and navigation visual interface in teaching/training multimedia is necessary. To reach this a reference should be performed on the recent IT systems in terms of their usability. The used indicators are: learning time, task performing time, number of errors made by the user for task execution.

The standardization of **the user friendly products**, which enables the smooth transition from one product to another, will help application of multimedia in education and will ensure end users trust and acceptance of the proposed telematic tools.

Learning and virtuality

The use of technology of virtual reality makes a learning process independent on the manipulated reality. It enables realization of movement – perception learning process, where the screen becomes a tool for pervasion of invisible space: users can navigate through this space and can operate within the structure finding all necessary details – small and great ones. This way, learners can touch objects, observe and experiment in a visible reality. Here, the entities and concepts become accessible and

abstract become tangible. The learning material can be exported in the same way as in the classical approach. The learner can work with much more awareness; he can investigate, discover, learn and make a necessary intellectual synthesis.

The virtual classroom and risk of “manipulation”

The movement – perception method of education is based on: observation, manipulation, try, analysis, confrontation, and interpretation of results. All these fundamental approaches are staying in the subsequent steps of the experimental method, which is used in science as a study manner. The last one is explored in life sciences for knowledge transfer and ensures students’ awareness in some particular scientific phenomena: physical laws, biological structure and organization, chemical synthesis, etc. This effective experimental approach is realized by trainers using different laboratories, equipment, chemicals and other appropriate premises. This way they receive opportunities for participation in a real reproducible experiment, which enable them to receive deep and sustainable cognitive development. This process, beginning with correct and scientific survey approach, make trainers able to choose their school orientation successfully. But what is sure is that this methodology possesses great limitations being high costly and difficult to apply for vast majority of learners.

Development and application of IC technology gives strong possibility to overwhelm this limitation by offering multimedia products. This way an assistant realization of experimental process could be made and trainees can really participate in it. But having in mind the power for dissemination of information through IT approach and the possibilities of artificial manipulations, a strong care should be kept in realization of these lessons.

So, the real experimental work must not be avoided in any case. It should be on the ground of multimedia lessons performance. Following this, the quality assurance of this process by building up of excellent virtual laboratories in training institutions, guarantee the validity of education provision.

The consequences

The need of widespreading the knowledge and building up the knowledge driven Economy in Europe fosters application of new educational technologies. Use of ITC reduces the distance between teachers and students from one hand, but from another it can lead to the replacement of teachers by experts or specialists. Also, the active students in this process can act as autodidacts who are responsible for their own learning as well as their choice for the path-learning.

This situation sets a question for possibility of spreading this approach at the lowest education level. If this happens, the following problems could be anticipated:

- Diffusion of basic knowledge assets provided at initial schools; omission of formation of interpersonal skills.
- Formation of learners with highly specialized and structured profile, and appearance of treat for

their overall culture reduction and development of isolation, distance, lack of group experience and social relationships.

If the telematics tools are used in a chaotic manner, the habit of learning together would be lost. If this happens, schools can not play their basic role: to be a main instrument of social growth. This possibility could cause a big problem to the progress of the society and to the achievement of the European goal through education to reach better social cohesion. So, in any case this problem should not be neglected and ignored. *Vice versa*, special measures should be taken for the appropriate use of telematics tools in the education, which could be reached mainly through development of a system for new didactic technology and introduction of quality management mechanisms and correspondent standards.

In order to reach the goals of European policy for sustainable development of the society, the following fields should be targeted in an appropriate way by application of IC technology:

- European citizenship creation;
- Development of highly competitive European economic platform, introduction of R&D results into practice;
- Faster widespreading of a new system for education in order to fit the demands for new and adequate professional skills and competencies;
- Effective measures to foster the process of transition of Europe Industrial Society into cognitive one: definition by Member States of minimum common basic competences to facilitate the real mobility of workers and trainers and formulation of sustainable work power market.

The necessary effect could be achieved by tight combination of measures comprising the above mentioned problems, and teacher – centered programs enabling assimilation of these new technological instruments and their integration in current learners training programs. This way a synergy could be generated between technology and content based on appropriate methodological and pedagogical approach.

Conclusions

Gathered contributions show that important progress of Europe is anticipated by the development of ICT infrastructures in education. Establishing a set of parameters capable to defense “a good educational practice” can build a bridge between education and production. This way, the number of competitive young people on the labor market will be increased considerably. Also, the need of permanent training required by SME’s will be satisfied. The stated need for introduction of scientific innovations and the personal training will be answered and will put in action the real innovation. Meanwhile, it is necessary to restrict the possibilities in training new type of teaching based on ICT into negative direction, thus supporting the imbalanced and non-homologues cultural growth. The results from such event will be very negative: they could be from destroying to

total refuse or strong limitation in receptivity of this highly innovative and promising technology. This way, the long term objectives of ICT based education and benefits to the society could be lost.

Recommendations

1. Introduction of ICT policies and strategies into long term educational objectives

The process of education is slow and in-depth, and the involvement of ICT does not alter these characteristics. Considering the analysis made and the ICT potential, it is vital that policies and strategies in that area be embedded by long-term educational objectives. It is obvious that ICT effects production in the economic system as well as fosters citizenship and personality building in the educational system.

2. Provision of new support services for education

The basic requirements for development of ICT supported learning provision are the appropriate services. Specific infrastructural elements like agencies, specialized centers, and support groups have to be funded and make active for technological and educational support. Such good turn has to dispose training and to advice teachers, teachers' trainers and managers, providing education. They also have to propose better presentation of learning paths, tutoring and guidance facilities for learners, as well as new approaches for validation and certification.

3. Management of change

The players in education – students, teachers, trainers, administrative staff and school directors need to be empowered with ICT-inclusive educational policies. The integration of ICT in educational system could be effectively reached through teachers' education. For this reason their own activity and practice should be stimulated. At the same time the decision makers should be motivated to grasp financial, regulatory, ethical and political issues, such as availability of "open source" material, privacy and "safety" of new devices (protection of minors, health risks). Learners should be acquainted with digital literacy and have to understand that media and IC technology influence their individual learning, thinking, creativity and their own expression.

4. Research development, definition of indicators and access to results and their application

Research in the field of education and social sciences needs explicit and permanent investment. The ongoing integration of

ICT into education could be successful on the basis of the both above mentioned fields. Only in this way an appreciation of good practice, evidence of improved academic achievements and scientific revealed discussions, and educational priorities could be achieved. Implementation in this type of education of specific socially weak groups should be on special attention. Otherwise, a social exclusion could occur due to the preliminary prerequisites for the educational use of ICT.

Perspectives

IC technology must have implementation both in formal and non-formal education with the following requirements:

- Understanding the educational goals by all kinds of actions in that field;
- Fostering the dissemination of existing study issues, policies and practices;
- Accomplishing of peer-reviews on European practices in application of approaches to education of tuition personnel and learner – centered tools /methods;
- Launching real indicators for evaluation of 'ICT in education practices and policies' outcomes.

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REFERENCES

1. **Bargellini M.L.**, Distance learning: opportunities and problems, <http://www.jrc.es/pages/iptsreport/vol116/english/ICT1E166.htm>
2. **Reichert R., Hartman W.**, On the learning in e-learning, Proc. EDMEDIA 2004- World Conference on Education Multimedia, Hypermedia and Telecommunications, 1590-1599
3. European Commission Working Group for "ICT in education and training", 2003 www.europa.eu.int/comm/education/doc/policies/pol/policy_en.html#programme.