

ICT in education: The dawn of new era or the development of an accessory?

1. Is ICT in education still an open question

During the last decades, Information and Communication Technologies (ICT) have been introduced in a dynamic way in society and in a far lesser degree in education. Formal education (i.e. primary, secondary, higher education) or informal education of various modes (i.e. professional training, life long learning etc), are all affected by ICT.

By ICT in education we mean all the contemporary digital tools, such as computers, accessories and Internet that can be used in education helping to fulfil its goals.

A lot has been said about the impact of the introduction of ICT in education. Some believe that ICT is a basis for a revolutionary reform in this field. Some believe it is a panacea. Others consider ICT in education as a very useful tool that will not necessarily change the function of education dramatically. In general (and this is the common ground of the above points) it is widely expected that ICT will solve at least some of the problems that education faces.

It should be noted that the academic and scientific dialogue concerning the effectiveness of ICT in education remains still an open issue. At the one edge there are those who believe that ICT should be applied in every discipline expecting that its penetration will improve the performance of every educational process. At the other end there are those who believe that penetration of ICT in education will not change things radically hence it should be dealt with caution, leaving no room for excitement.

There are grounds to believe that ICT will improve education. Thus:

- ICT can be used as a substitute for almost anything in the class: pencil, book, telephone, TV, encyclopaedia, map, library and many more.
- Practically, with ICT, all the applications can be implemented using repeatedly very few basic techniques and devices, as well as a symbolism that becomes more and more standardized. It is noticeable that using only a PC (which is a multi-tool in education) and the Internet (which is a big river of information and communication), a lot of solutions are offered in various issues and fields. This certainly facilitates the learning process.
- Since technology has helped many other branches of activity or areas of human life we expect that it will help education.

It is a fact that indirectly ICT has started affecting all people hence all groups of educational communities – learners and teachers. There are also grounds to believe that ICT will help them in a direct way too.

2. There is inertia of education related to ICT

a. A Global Issue of mass character

Education is a global-scale issue of huge “mass” and concerns a very large number of people. Its mass character is the result of an evolutionary process that reflects democratic ideologies and the adoption of human-centric social policies. This mass keeps increasing, furnished with new ideas and practices; lifelong learning is one of them.

Such a huge, non-elitist mass character is certainly good in a democratic world, since it offers to an increasing number of people (if not to everyone) the opportunity to become educated.

However it has also a corresponding huge “inertia” against changes; in other words the fact that education is a huge sector of activities obstructs any change especially if this change involves expenditure -as is the case with ICT.

b. An investment with no immediate return

Worldwide, a very large part of formal education (primary, secondary and higher) are organized and run by the state. As far as a government is concerned, investment in education yields returns in the far, if not in the remote, future. Especially when acute and immediate needs are encountered, as in cases of severe poverty, such educational targets as the introduction of ICT become of secondary priority.

However it is in these cases that ICT could provide real solutions, offering at the same time the chance to improve the development rates of poor societies in an extended time scale.

c. A Cultural Issue

The real inertia of education is the lack of technological culture that exists in most parts of the world. There are historical, social and psychological reasons for that. Thus:

For a very long time in the past, the school provided an environment, which differed substantially from the environment in which other functions of society were taking place. School uniforms, conservative ideas, political, social and religious stereotypes, formal way of addressing pupils and teachers, even a different way of speaking, formed a military-like culture to which everybody had to conform. The modern character of ICT culture seems to contradict the strict culture that dominated behaviour in most educational environments.

Nowadays, all these have changed and the atmosphere in a class is very different from that in the past. However there is still some noticeable backwardness. In a modern society, nowadays, outside school, everybody uses technology, plays with technology and works with technology. In today’s class in many cases the only equipment that exists (depending of course on the specific social environment) is the same old traditional blackboard of past ages.

3. Change due to ICT has already started

Some important changes are already under way in education, due to ICT. It is a fact that some widespread, cheap and simple technical solutions have already produced substantial changes attributed to ICT. Such changes are in the following:

- (a) The teaching and learning practice in institutions of any level (schools, universities etc). e.g.
 - **Mathematics** (Formulae calculation, trigonometry, algorithmic solutions, logarithms, square roots etc)
 - **Language** (Spelling and syntax corrections of sentences, voice recognition)
 - **All other subjects** (Multimedia)
- (b) New teaching ideas, approaches and methodologies have being developed, relying on ICT and applied on different levels of education. All of them are used at an increasing rate; e.g.
 - **Distance Education** (The traditional teacher - student scenario is eliminated)
 - **Home Schooling** (Many American kids do not go to school but work at home)
 - **Cross-curriculum Applications – Multidisciplinary** (Part of school curriculum involves multidisciplinary activities and subjects)

- **Virtual reality** (Still at a pioneer level. It promises to give an insight in many educational fields, especially in developing dexterities and producing first person learning i.e. not through symbols. With virtual reality, the learner can “live” virtually dangerous phenomena or phenomena with no other access, apart from a virtual one, such as the solar system, volcano, human body, historical events etc.)

4. Development theories support ICT in education

The theoretical background concerning economic development can be considered as an advocate in favour of ICT in education. Reference here is made to the theory of human capital. Specifically: Individual human capital may be defined as the sum of knowledge and experiences that an individual possesses. Social human capital is defined as the sum of knowledge and experiences that a society possesses.

The rationale in the heart of the human capital theory is that:

- The better the quality of human capital the higher the productivity.
- The higher the productivity the more the (economic) benefits for the individual and for the society. This is so because high quality of human capital is associated with:
 - Better understanding of ideas,
 - Better communication skills
 - Better expression of ideas
 - Higher adjustability to new working environments.
- Quality of human capital depends on the quality and quantity of education and training.

The above rationale supports the view that:

The higher the penetration of ICT in education, the better the quality of schooling, hence the better the quality of human capital and the higher the productivity. In the same sense, according to the human capital theory, education, not only increases productivity of the person who possesses it (hence this person is rewarded - paid better), but also creates the conditions for more non-financial benefits for the society (more sensitivity to social issues as health, environment, family etc).

5. Different skills will be needed in the work market

With the introduction of ICT, the teaching – learning process will change and new skills for the teacher and the learner should be developed. Thus:

Methodology and content of teaching will change so that the learners will benefit most from the new technology.

Learners will not be evaluated only according to their knowledge but mainly with respect to their ability to achieve goals with all the technological means available to them.

The situation reminds of writing open-book exams. More specifically:

- The teacher has to organize and arrange all the technological means available in the classroom, to spend time for planning well and scheduling his performance and for choosing carefully the educational material for which the options are dramatically increasing. More structure has to be developed and new ways of interaction/dialogue have to be devised. The teacher will have to act more like a manager/director and not simply as an actor in the simple teaching model.

- From an information point of view, the pupils -through ICT applications- have certainly more information available to them than what they need. Hence they have to develop the skills to choose. For example, in the past, reading in depth was an important skill for a scientist. Now speed-reading is of great importance too.

6. Are there limits of ICT in education?

Technology evolves in an **accelerating and non-linear** way. Hence, not only it develops very fast, but also discoveries in science and technology, from time to time, produce a discontinuity in the impacts of technology on our lives. ICT is becoming cheaper, smaller in size, friendlier and more effective (a good example is the evolution of the basic switching device, from electronic valve to transistor and to integrated circuit).

To the limit of the foreseeable future could one anticipate the end of education, as we know it?

In order to consider this question, it is worth looking at an example from another discipline: Thus, technology has affected the field of medicine in a dramatic way. Nowadays,

- Medicine can show how the human body works (Genetics, Biology, etc)
- Medicine can alter and change human parts and improve the body's functions (DNA changes, implants, artificial parts etc are an increasing reality)
- It seems that at present the only area that Medicine has not gone too far is to understand and to intervene to the way the human mind works.

However, what will happen if progress is achieved on this front?

Though frightening, it may be argued that in such a case, advances in medicine may change the way we are, the way we think and the way we function.

Turning now to education, the prospect is that in the foreseeable future there will always be an educational system in a country (Ministry of educations, teaching institutions, educational levels etc) in the same way as there will always be a health care system.

However, what will happen if progress is achieved on this front?

The prospect that education will be replaced by a bioelectronics' procedure is at the moment a favourite subject for science fiction. For how long will it remain unforeseeable?

7. Conclusions

The goal of education is to help people, especially young people, to participate in the functions of society, to acquire knowledge and to develop skills that will help them to confront the needs of the future and to be productive and competitive in tomorrow's world.

It is our experience that many people in the developed world are working in jobs that did not exist some years ago.

It is certain that the future holds a lot of surprises.

It is another major task for education to give young people the qualities and the skills for the jobs that do not exist yet -and ICT can help a lot towards that!

It should also be a major task of the educational system to provide these qualities and skills in an enjoyable and modern way.

ICT offers a chance for reform in education along such lines. Will educational factors reciprocate?