

IMPLICATIONS OF INFORMATION TECHNOLOGY AND COMMUNICATIONS (IT&C) INTRODUCTION IN EDUCATION

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Education in general and the IT&C domain are subject to constant changes, both through policy formulation by the government or by private organizations and the continuous transformation of the needs generated by the recipients of the services generated by the aforementioned areas. These permanent changes, which are extremely dynamic and complex, have profound social, economic and cultural implications, which are difficult to predict and estimate in-depth. This paper aims to highlight the need for an integrated thinking in terms of making decisions that apparently are only related to the introduction of IT&C in the education field. The extensive and intensive use of technology should be carefully weighed also from the point of view of the impact it may have on short, medium and long term, in terms of the economic, social and cultural impact, at national or global level.

Key words: *IT&C; education; integrated approach, P(olitical)E(conomic)S(ocial)T(echnological) implications.*

1. INTRODUCTION

The education domain is one of the most challenging areas for each nation, due to the powerful impact it can have on the future development of society and people. Society, generally speaking, must consider very seriously the responsibility for the development of a state-of-the-art educational system, which can add high value to a nation in all its aspects: political, economic, social, environmental and cultural.

Each modern educational policy provides a general framework consisting of human, material, financial, informational and judicial resources. However, some concerns arise on issues such as how much and when to use information technology and communications (IT&C) in the process of education and instruction. There are many success stories about

computer based education, but at the same time there are also failures and drawbacks in terms of the multilateral development of a person. Most of the personnel involved in the education area have experienced both success and failure in their activity, through too much or too little use of IT&C, caused by the rapid changes in their micro- or macro-cosmos of education. Sometimes their frustration may lead to extreme reactions on using the IT&C during learning activities, such as rejection of these resources or using them indiscriminately, in areas where other types of resources (such as the human resource) would be more appropriate.

In this respect it seems obvious that a balance must be struck among multiple desires, policies (either personal or group led), and interests in relation to the propensity of the IT&C industry to promote various

devices like a must-have, and the opinions of the representatives of the old fashioned way to educate and instruct. This is not a simple task and may require an in-depth, difficult and time consuming process, but once completed, this process shall form a very strong foundation for what may be called solid, durable and adaptive education.

2. DIFERENT PERSPECTIVES

2.1 The education perspective

There are many ways to define or to characterize the overall concept of education. It is not the intent of this paper to introduce a new definition, but generally speaking education (instruction) consists of a continuous process of learning. The purpose of learning is to acquire knowledge, skills, and habits in order to use them in daily life and this acquisition process is generally achieved through teaching, training, and/ or research. There are many systems and variations of them that can be applied, starting from educational policies at state level and finishing with the micro cosmos of educational methods used by the educators for a specific education activity, such lessons or seminars.

In this respect, none of the lessons learned through hundreds and hundreds of years have to be left aside in the process of deciding the main framework of education: who are the subject of education, what knowledge to be delivered, what skills and habits to be developed, when it is the right time to do this, in what location education activities should take place and what kind of supporting educational materials should be used.

There are some considerations to made in order to emphasize the impact of technology in the transformation of the educational process.

A few years ago, the assessment of the IT&C impact in education was difficult. When the computer era began, it generated a lot of enthusiasm and many voices declared that there is no need for professors anymore. Since that time, the experience has showed that no technology, no matter how advanced, can yet replace a good educator. Consequently, the changes to be made are in the field of educational methods, in order to find out the right use of technology for the right educational objective.

Because of the global network of relations already established, there are a lot of successful models where the IT&C use in education is very effective. At the same time there are also failure examples, with huge negative impact for short and/ or long term. The idea is to incorporate in the educational policies and strategies only what is effective and helps achieve the long term vision and not to insist in repairing what was wrongly designed from the very beginning.

There are more and more initiatives to introduce IT&C devices and even more complex technology in education. This tendency can be observed at all levels, as initiatives from enthusiastic professors, as school initiative (using funds from various sources or as part of collective research), as more elaborate policies addressing an a specific target group, and not in the least, at country level.

Regardless of the level of education, this deployment of IT&C will impact significantly the education area. It transforms the old fashioned way of teaching and communicating between educators and the subject of education. IT&C brings both advantages and disadvantages to the education area, and it is the educational system's duty to make sure that only the appropriate processes will be implemented.

There are some examples backing up the aforementioned ideas. In Romania, several schools are in the process of implementing various projects related to the introduction of IT&C and associated software for educational purposes only. The Superior Commercial School “Nicolae Krețulescu” from Bucharest received 20 tablets, 1 laptop, an e-board and electronic manuals from a private sponsor to boost their competitiveness among high schools [1]. Another example, the Pedagogical High School “Carmen Sylva” from Timisoara has won a competition and received a prize consisting of 31 high end tablets, two laptops, a smart board and dedicated software. All of these assets contributed to the increase in the ability of the students to acquire new knowledge, based on real time communication with professors from their school and from abroad [2]. At the level of the Romanian government, the Ministry of Education intends to allocate 100 million Euros from European funds to provide a tablet for each student in primary, secondary and high school [1].

In other countries, the situation is relatively similar, but at another magnitude. In USA, for example, St. Mel School from Woodland Hills, California, has decided to give each 5th grade student a tablet in order to accomplish all the educational and communicational tasks. The results obtained after a very short time were amazing, according to the principal. They have found also other environment friendly benefits, because of reduction in paper waste and in the funds required for other educational materials [3].

In Norway, at Sandvika High School, Professor Anne Michaelsen has started a very challenging work aimed at renouncing at the traditional blackboard and chalk, and even the

whiteboard and marker [4]. She created a new method, a “digitally rich” environment where her students are learning constantly through online devices and software. The class is using Quadblogging for all educational and communication tasks. If the method would be generalized, the impact over the education industry may be tremendous.

In South Korea, the government is trying to take advantage of the technological advance of the country and to replace all paper based materials used in education with electronic based resources, of course by using tablets [5]. The project is a huge challenge and is estimated to total 2 billion USD.

The last example concerns OLPC (One Laptop per Child) [6]. This kind of project overrides national boundaries and may create a lot of opportunities for education, even for children, communities, and countries which do not have at their disposal large amounts of money for this purpose.

However, not everybody is enthusiastic and ready to make the shift to the IT&C deployment at any cost. There are studies which outline the drawbacks of using tablets excessively or intensively.

Upon a study conducted by UCLA in South Korea, the concept of “digital dementia” has been introduced, associated with short memory dysfunction of a person who uses electronic devices such as smartphones, tablets, laptops intensively [7] [8].

Another study focused on the ability of children to work with images, when they learn words and their meanings [9]. At very early ages, the impact of using tablets instead of classical methods may lead to dramatic changes in their perception of words and alter the formulation of proper constructions in the communication process.

The study has mainly shown that a person who learns foreign languages by classical methods instead of intensive computer based instruction may boost his/ her brain capacity and may become more effective. In this respect Giovanni Sartori's work, *Homo Videns*, signals the problem of social integration of the overexposed teen generation to what can be called "fluorescent screens".

So one of the interesting questions that arises is the following: Is it better to replace the old fashioned way of learning alphabet with a Word typing environment?

2.1. The economic perspective

The interaction between education and IT&C will create many interesting connections with other domains such economy.

Education always means proper infrastructure, such as buildings, didactical materials, books, utilities (electricity, water, Internet access) and most importantly, human resources.

Any decision to be made in order to change the actual situation, at micro and/ or macro level, will definitely affect many other domains.

Lack of access to IT&C may have negative implications on computer literacy rate (which is on the increase, becoming as important as the literacy rate, at least in the developed countries, and in many developing countries).

Some of the implications of fully deploying and using IT&C at its full capability are addressed below:

- Students may stay at home, as the access to online communication allows everybody to communicate with everybody. Consequently, there is no more need for buildings and the utilities associated with them (energy, water, Internet,

transportation for students only) shall be decreased;

- Students do not need books and other paper printed materials. It will be a reduction in printing materials to be worked on at home with associated effects such paper industry declining, unemployment in the sector, and other effects related to the horizontal businesses;
- Many employees in the educational area and in connected areas may need to move to other jobs, with other qualifications that may require supplementary costs for society or for individuals;
- Some businesses may disappear because they are related to old fashioned education process;
- The increasingly request for IT&C may lead to a boost in production and selling of equipment, locally or abroad; that may lead to more jobs in this industry and more taxes to be collected;
- IT&C may boost local economies even by linking remote and unknown areas with more developed areas;
- Proper usage of IT&C in education may support sustainable development in two main ways. The future employees of the IT&C industry are receiving their knowledge and developing their skills mostly through the education system. At the same time, they can better understand the real needs for IT&C of the education domain.

In a survey made by Eurostat, among the obstacles in the path of lifelong learning for 2011, it is listed the lack of access to a computer or internet connection (in the case of long distance learning), along with other factors such as health or age, financial situation, lack of

employer's support, conflict with work schedule or distance related challenges. In that particular statistics, Romania features the highest rate of respondents, 10.4%, encountering the aforementioned problems, while within the European Union the average totals 1.6% [10]. Even though the data from Romania is listed as unreliable due to specific reasons, it is still significantly higher than the similar rate of other countries, including those of Central and Eastern Europe. Although the statistics apply to the particular area of long distance learning, it is illustrative for the increasingly important role the IT&C begins to have in the education area.

Table no. 1. Countries with no access to a computer or Internet for distance learning
Source: EUROSTAT

EU-27 (*)	1.6
Euro area (EA-17) (*)	1.8
Belgium	0.5
Bulgaria	1.4
Czech Republic	1.2
Denmark	...
Germany	1.8
Estonia	2.8
Ireland	0.8
Greece	2.5
Spain	0.6
France	1.9
Croatia (*)	...
Italy	3.0
Cyprus	...
Latvia	2.3
Lithuania	1.3
Luxembourg	...
Hungary	1.3
Malta	...
Netherlands	2.6
Austria	1.6
Poland	0.6
Portugal	...
Romania	10.4
Slovenia	...
Slovakia	0.5
Finland	1.8
Sweden	...
United Kingdom (*)	...
Norway	2.2
Switzerland	4.8

3. CONCLUSIONS

As it was mentioned in the previous examples, the financial burden will be huge and not all communities or countries will be able to afford it. Each decision-maker has to carefully analyze and decide upon the issue.

We live and function in a very challenging environment and each decision has an immediate impact and/or long term effects. An honest analysis of the environment and an honest formulation of the hypothesis may create a proper framework for designing the educational system in tight connection with IT&C.

An educational system analysis has to provide the right answers regarding the effectiveness of IT&C deployment in education. It is not the place for large companies to decide what is needed for education and how to replace the role of professors, only in the name of profit.

In this respect, society is responsible for encouraging the best solutions for development and for requesting authorities to make more efforts in this direction. It is important for such efforts to be performed at national level, in order to allow all citizens equitable access to modern, sustainable and effective education.

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