



Education for a Sustainable Digital Environment

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Introduction

The celebrated Encyclical *Laudato Si' On care for our common home* by Pope Francis (2015) declares the need to help the media in the digital world “to become sources of new cultural progress for humanity and not a threat to our deepest riches”.^[1] This is our great responsibility as educators towards the construction of a sustainable digital environment. We must learn and teach the *care of our digital environment* as we should do for the care of our common home, our *natural environment*. In fact, the great novelty for humanity is that we have constructed a *new home* on top of the natural one, and both need our constant care, because they interact in a great variety of ways. The natural environment has been given to us, the digital environment, instead, is a human construct with new properties in permanent and accelerated evolution that we cannot find in nature. The increasing interaction between the two environments exceeds our imagination; the Internet of Things is one impressive example of this trend. And this interaction should be improved and protected by a *sustainable digital and ecological education*.^[2] This is essentially an ethical engagement, not only a technological one.

This new ecosystem must support a “healthy internet” to keep our digital environment in good shape and provide the necessary means to face the increasing dangers of all kind of crimes that are taking place everywhere in our connected world: aggression, violence, bullying, grooming, sexting, sexual abuse, commercial exploitation, etc. Many organizations, public and private are dedicated to controlling, eradicating and punishing the multiple perversions that are corrupting the digital world. Hundreds of digital initiatives around the world are today working to protect the most fragile sectors of the population, children and families in the first place. It is a moral engagement on human dignity. We can mention some international initiatives such as UNICEF *We protect: Global alliance against child abuse online. Worldwide cooperation to stop the crime of online sexual abuse and exploitation* (77 countries); IWF *Internet watch foundation*, UNICEF: *Child online protection project*; UNHCR: *United Nations Refugee Agency*.

The Final Statement from the Conference organized in Rome by the Pontifical Academy of Sciences and the Foundation for World Wide Cooperation (October 10, 2017) on *Internet Connectivity as a Human Right*, stressed the fact that “It is necessary to reaffirm the role of the Internet as the primary means to enable inclusion, efficiency and promote innovation in different economic sectors as such as healthcare, agriculture, the environment, jobs, gender equity, and mutual understanding... Education is the clearest example that the internet is a human right. Even in the 21st century, hundreds of millions of children have no access to school or leave school unable to read. With internet connectivity, they could improve learning capacity. This is of vital importance for the poorest children of the planet”.^[3]

Moreover, as Pope Francis recently declared to the participants of the congress on *Child Dignity in the Digital World* (2017), “we have to keep our eyes open and not hide an unpleasant truth we would rather not see. In fact, the net also has a secret dimension (the “dark net”), where evil finds ever new, effective and pervasive ways to act and to expand”.^[4] A sustainable digital environment must become a place of justice and peace for all. And the main path to reach this goal for humanity is education.

Talents and handicaps

The digital environment expands our cognitive capacities in the most diverse situations, giving unique opportunities to develop our talents and to overcome many limitations. It is in *the margins of society* where the impact of the digital environment is most needed. In particular, I will give some examples in special education and rehabilitation, in the social inclusion of refugees and immigrants, and in remote places without schools.

In other studies I have shown that the *click option* is a basic unit of behavior. In the case of humans, the possibility to use the click option since the first months of life is key to many neurocognitive developmental studies. In fact “to click or not to click” is a universal proposition of enormous importance. It can be represented by the elementary lattice of 4 nodes of a Boolean algebra. Moreover with Percival Denham we have proposed the click option as the “core” of a new kind of intelligence, a *Digital Intelligence*, that could be included in Howard Gardner’s taxonomy of Multiple Intelligences (MI). A most useful property of the click option is that it can be

recorded by a precise neuronal activation at the cortical level as a *covert mental* event that can be detected by brain imaging techniques while the *overt behavioral response* is expressed by pressing a key, for example.[5]

It is interesting to remember that among the first attempts to deploy a digital environment in education several decades ago many disabled children were those who were leading the new field. For example, deaf children started to use computer networks for communication at the very beginning of the whole movement, in the early 80s, well before most of the hearing students of their generation. Today, the use of powerful neuroprostheses as cochlear implants, also based on digital technologies, have changed radically the education of the deaf and have become a remarkable feat of a sustainable digital environment. A similar approach is now implemented with the promising new retinal implants. There are also several neurotechnologies known as “neuromodulation prosthetics” that try to overcome the burdens of many disabilities in the motor system, via Deep Brain Stimulation (DBS). A most remarkable advance in movement restoration is being produced by Brain Computer Interfaces (BCI), that bypass damaged brain structures. We are still in the first stages of the implementation of these neuroprostheses that may even improve some cognitive abilities by interfacing with Artificial Intelligence procedures, but, as John Donoghue clearly affirms: “Changing brain circuits raises ethical issues” because they can affect personality or behavior. We need to protect human dignity in all the digital environments we are creating.[6]

Today the number of disabled people that have significantly improved their life with the help of the digital technologies is increasing in the whole world and their success becomes a continuous source of inspiration to expand a sustainable digital environment for all. Our dear colleague Stephen Hawking gave us a remarkable example of a whole life of impressive scientific achievements and social interactions with his exceptional courage and his ability to overcome the extreme restraints of a severe lateral amyotrophic sclerosis with a clever use of the digital environment.[7]

In my experience of several decades working in the rehabilitation of disabled people with the help of ICT I have recollected many moving and suggestive experiences. I will never forget the quadriplegic architect who learned to draw buildings in his computer with his voice, well before internet, who told me “I need a voice for the winter”, the digital environment has no seasons... I had also the privilege to follow for some twenty years the remarkable development of Nico, a boy who was submitted to a right hemispherectomy when he was 3 years old, because of intractable epilepsy. He started to use a computer in the first grade of school and loved to program digital artwork. He has now become an accomplished painter and a national champion in fencing and is a truly remarkable example of the amazing capabilities of human neuroplasticity. Even if artificial neurons, “neuromorphic neurons”, can compute faster than those of the human brain and fire up to one billion times per second, current robots cannot yet work with only half of their hardware or software, but Nico is thriving with a half brain. Similar cases of neuroplasticity have been described after a left hemispherectomy. A sustainable digital environment is crucial for disabled people and we must take special care to promote and enhance digital accessibility to all of them.[8]

The role of elders in supporting the sustainability of the digital environment

We should also reflect on the impact of the digital inclusion of senior adults in our globalized society and in the ways they can support the sustainable status of today’s digital environment. Indeed, the profound changes in the world’s population distribution, the significant and constant increase in the number of elderly people, is having a great impact on society and is transforming the future of humanity. Some studies estimate that by 2020 about 1 billion people will be over 65 years old (the so called 65+). At the same time in some developed countries people over 75 show a healthier status and a better use of neurocognitive skills than those of the same age some 20 years ago. In a sense “old age is getting younger”. Our dear colleague and Nobel laureate Rita Levi Montalcini dedicated a whole book to the significant cognitive resources of old leaders in the arts, sciences and politics, and famously said on her 100th birthday anniversary that “the brain doesn’t go into retirement”.[9]

As for a permanent education for the ageing population there are hundreds of academic initiatives in the world, including the programs of lifelong learning by UNESCO, University of the Third Age (U3A), Open University, etc. These developments show the emergence of a new field of research: *Gerontechnology*,[10] which pursues the practical aim of designing technologies and environments for independent living and social participation of older persons towards a better health, comfort and safety.

As an example, we can mention the success of Uruguay with the *Ibirapitá* program, which is giving 400,000 tablets to those retired citizens over 65 who do not work and receive a monthly pension of less than 800 US\$ per month.[11] *Ibirapitá* was launched by the government of Uruguay in May 2015 to reduce the digital gap in the third age, when only a 4% was using a computer. The program was an immediate success and was supported by a network of national institutions, the Ministry of Education (Centros MEC), the telephone company (ANTEL), the University for Senior Adults (UNI3), the Plan Ceibal (aprender tod@s) and private initiatives. A recent initiative is a collaboration between *Ibirapitá* and AGESIC, the national organization that

implements a Digital Government for citizenship inclusion. *Ibirapitá* is thus actively promoting the unfolding of new talents, the “late bloomers” of the digital environment. This new population of retired people is joining the community of all teachers (40,000) and students of public primary, secondary and technical schools (some 700,000 today), who already have tablets or laptops connected to the Internet by the *Ceibal* program.[12] Today we can see how grandparents are spontaneously helping to educate their grandchildren in the *good use* of the digital environment they all share. It is certainly moving to observe the unfolding of those new links without borders among generations. A modest household in Uruguay today is an example of a sustainable digital environment where several laptops and tablets connect the whole family for a variety of purposes. The development of this new kind of *connected family* via portable tools (smartphones are starting to be included in increasing numbers) also provides a new hope of reinforcing a sustainable digital environment where the “digital family” has new rights and duties that must be taught and respected. The dialogue between generations is essential for our society, as Pope Francis always recalls, and the expanding digital environment is now becoming a suitable place for this exchange in the most diverse situations.

Immigrants and refugees in a digital environment

A joint meeting of the Pontifical Academy of Sciences and the Pontifical Academy of Social Sciences *on Humanism and Mass Migration*[13] recognized that the “forced displacement of millions of human beings represents an existential crisis of our times, causing suffering in others that we should consider as ourselves. Millions of forcefully displaced, of refugees, of asylum seekers, of unauthorized and irregular migrants – our brothers and sisters – are placed in barbaric conditions that rob them of their human dignity and their inherent capacity to flourish. The catastrophic migrations of the 21st Century are most unforgiving to millions of children”.

The recent report from *UNICEF, State of the world's children 2017 – Children in a digital world 2017* makes clear the enormous importance of ICT in the social and cultural inclusion of millions of displaced persons.[14] For the same purpose a letter from the Permanent Observer of the Holy See, Msgr. Bernardito Auza to the UN Secretary-General encouraged States “with significant labour migrant inflows to adopt national policies which protect against exploitation, forced labour, or trafficking” Some examples would be: “Enact national policies which allow migrants, asylum seekers and refugees to access and use telecommunications, such as the Internet or SIM cards for mobile telephones, without burdensome procedures or fees”.[15] Most of them are in desperate need of communication with their families and friends. The digital environment can become clearly a second home for immigrants and refugees.

This humanitarian recommendation to provide connectivity to all is a central issue for migrants and refugees: to remain in contact among them and with family and friends they left behind, and of course to deal with the challenges of being a stranger in their host society, frequently with a different culture and language. Belonging to a digital environment means for them to feel, in some sense, at home again. This digital access is an enormous asset to help their inclusion in the new society. Computers, laptops, tablets, smartphones, are bridges of freedom and support. Many can now enjoy all kinds of apps to improve their new life, automatic translation of voice and texts, access to public services, transportation, health, online education, etc.

A decade ago with Dean Marcelo Suárez Orozco we imagined providing free digital tools to immigrant children to maintain and enhance the communication with their family and friends remaining in their native country. This proposal was very difficult to enforce at the time but now we are pleased to verify that it works in places where the digital environment is already available to all students and teachers in public schools. This is the case of *Plan Ceibal* in Uruguay where all immigrant children attending public schools are equipped with a tablet or laptop connected to Internet. We must also stress the increasing role of smartphones in the hands of children and adolescents and the new opportunities and challenges this ubiquitous technology is creating around the world. A recent book has been dedicated to analysing the multiple types of inclusion of the ITC in Latin America.[16]

With Marcelo Suárez Orozco and Sebastián Lipina, we organized in October 2018 the 13th course of the International School on Mind, Brain and Education, at the Ettore Majorana Foundation and Centre for Scientific Culture, on *Migration and education*, to discuss the fact that “worldwide, civil and ethnic wars, structural violence, unchecked climate change, environmental cataclysms, and poverty are behind the largest displacement of people since World War II. Today there are over 65 million forcefully displaced and 22.5 million formal refugees of whom half are children and youth. We shall endeavor to cultivate and disseminate high quality data and conceptual work, relevant policy interventions, and best practices as a way to shape new practices and inform change”. We published a statement online to consider *Mass migrations as a planetary emergency* and many colleagues around the world are now signing this declaration.[17]

One crucial issue in the social inclusion of immigrants and refugees in the host country is the urgent acquisition of a second language. This requirement demands a profound neurocognitive transformation that can be greatly

supported by a digital environment. In fact, several countries have deployed special initiatives to facilitate the new linguistic skills using digital tools. Among them smartphones became a first choice.[18]

Digital schooling without schools

Advances in communication and information technologies are so impressive and several implementations that were impossible to imagine even a few years ago are now provoking substantial changes in extreme cases in remote places without schools.

The current example of the first testing of the *global learning X Prize* in Tanzania, reveals how much a child can learn by himself – and by peer learning – with the help of connected tablets that are distributed in small illiterate and isolated communities without adult support. Children can learn and teach each other when they have access to a connected tablet using special apps designed for learning arithmetic, reading and writing. [19] This is only a first but encouraging step towards education that will help to build a sustainable digital environment for all in developing countries.

Conclusions

We have sufficient evidence today that the digital environment is experiencing exponential growth in the most diverse situations around the world. We must take care to make it sustainable and capable of dignifying the human person during his or her entire lifespan. Education is the best instrument to provide such a delicate balance between the rights and duties of the individual and society. As Ghandi said: “On the River Ganges of human rights there rise the Himalayas of human duties”.

END NOTES

[1] *Encyclical Letter Laudato si'* of the Holy Father Francis *On care for our common home* (24 May 2015) “47. Furthermore, when media and the digital world become omnipresent, their influence can stop people from learning how to live wisely, to think deeply and to love generously. In this context, the great sages of the past run the risk of going unheard amid the noise and distractions of an information overload. Efforts need to be made to help these media become sources of new cultural progress for humanity and not a threat to our deepest riches. True wisdom, as the fruit of self-examination, dialogue and generous encounter between persons, is not acquired by a mere accumulation of data which eventually leads to overload and confusion, a sort of mental pollution. Real relationships with others, with all the challenges they entail, now tend to be replaced by a type of internet communication which enables us to choose or eliminate relationships at whim, thus giving rise to a new type of contrived emotion which has more to do with devices and displays than with other people and with nature. Today's media do enable us to communicate and to share our knowledge and affections. Yet at times they also shield us from direct contact with the pain, the fears and the joys of others and the complexity of their personal experiences. For this reason, we should be concerned that, alongside the exciting possibilities offered by these media, a deep and melancholic dissatisfaction with interpersonal relations, or a harmful sense of isolation, can also arise”.

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[3] Final Statement of the Workshop on *Connectivity as a Human Right*, Casina Pio IV, 10 October 2017, Vatican City.

[4] Address of His Holiness Pope Francis to the Participants in the Congress on *Child Dignity in the Digital World*, 6 October 2017.

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