

DIGITAL NATIVES: HOW DO THEY LEARN? HOW TO TEACH THEM?

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Information and Communication technologies (ICTs) have changed our societies. Not only they provided us with new techniques and tools; they are also changing many core concepts and values. The relationship people have with technology is changing, and new social behaviors are appearing: we collaborate with peers in new ways; we network with others. Knowledge is changing; access to and acquisition of knowledge are changing; the ways in which we work with others are changing. In this digital society, a new generation has emerged: *the digital natives*. Who are they? How different are they? How do they learn? How can one teach them? Such questions are now raised for all education systems.

TOWARDS A DIGITAL SOCIETY

Information processing (*informatics*) has developed with computers: Information is digitalized, which means expressed through a series of “0” and “1”, and then processed, the basic component of a processor being a transistor. Information of any kind (letters, words, images, photos, videos, sounds, music, etc.) can be expressed in binary digits. Communication technologies are devices designed and built to transport information – for example, the telephone, created to transport oral information from one place to another one. Digitalized information is easier and quicker to transport, which makes possible to transport any kind of information: words, images, sounds, etc. Merging information technologies and communication technologies into ICT made possible a fast and massive development of new technologies: computers, telephones, cameras, televisions, music players, smartphones, tablets – all kinds of digital devices. Digital tools and ICT are now everywhere in our life, and we speak of a “digital society”. A digital society is a technological society, one in which information and communication are core concepts: Information has become a valuable economic good that one can buy, store, and sell. Communication has become an economical challenge. Digital communication is so easy that it is now accessible to almost everyone (In 2010, there were approximately 5.3 billion mobile phones in use, and 2 billion Internet users). What kind of society do we live in? If we focus on technology, we speak of a digital society. If we focus on information, we speak of an information society. But if we want to stress the human side of a society, we must focus on knowledge and human communication, and in that case we speak of a knowledge society. In the digital society, some core concepts, tools, and competences have developed; a citizen of the digital society needs to master these concepts, tools, and competences, and must be aware of their stakes and consequences.

DIGITAL NATIVES

The concept of digital natives was introduced by Mark Prensky (2001). Digital natives represent the first generation to grow up with this new technology. They are used to all kinds of digital toys and tools, which are an integral part of their life. Digital activity is like a mother tongue for them. They are the generation of technological acceleration, of the Internet and its networks. Growing up in such an environment, they think and process information in a totally different way than previous generations: their thinking patterns have changed, and Mark Prensky says it is likely that their brains have physically changed, too. They are “native speakers” of the digital language. This is a radical change, such that there is a big discontinuity between their generation and previous ones.

Digital natives understand the value of digital technology, and they can practice it in a spontaneous way. Among these values, one can quote immediacy, accessibility, free access. The abilities and competences of digital natives do not mean that they all are specialists, inventors, designers, developers. They are digital users. They are “born digital”, which applies to the digital devices, but also to reading, writing, coping with knowledge, etc. In terms of technology, the digital generation has a lot of new and impressive competences. They have an intuitive mastery of informatics, computers, electronic devices, and mobile equipment. They don’t need to read the user manual and they don’t ask for lessons on how to use a computer. (Only teachers ask for such courses!). This generation is the generation of “web 2.0”: interactivity, community, communication, collaboration. This gives them a new vision of time and space: “I can communicate with any person, at any time, in any place,” “I can access lots of information.” Constant accessibility to people is now considered as normal. Immediacy and mobility are two major keywords of this generation. They are used to a multiplicity of communication modes, they are permanently connected, even over-connected, in a kind of digital hyper-activity. Multitasking makes it difficult for them to concentrate for a long time on one activity. The questions that everyone asks are, who will they be when they will be 30 years old? What will be their relationship to media? What will be their values, their usages, their attitudes, their expectations?

DIGITAL NATIVES AND THE GENERATION Y

Generation Y comes after the baby-boomers and generation X. Being born just after the world wars, the baby-boomers constituted a generation of fun, consumption, and social achievement, in the context of reconstruction and economic development. Everyone was intended to find a place in society. Of course, all expectations and hopes were not met! Then came generation X (1960–1989), which grew up between the decline of the colonial Empires and the fall of the wall in Berlin. Their generation was confronted with the economic crisis and the increase of unemployment. Deep moral transformations occurred. It is also a generation for which individualism was developing. The balance between professional life and private life became more and more important. And, of course, it was also the generation of the technological revolution (the “TV generation”).

Today’s generation is often called generation Y. It is the generation of digital natives. But we must keep in mind that this generation has many other characteristics, which are as important: It is a generation of massive unemployment, it is marked by globalization, and it is a generation that did not know a world without AIDS. The moral transformations of the sixties are now accepted and integrated by a majority. Ecological awareness and the future of the planet are strong concerns. It is also a generation of growing independence, a certain insecurity towards the future, and a strong desire to give a meaning to what they do. Today, as the generation Y reaches adult age and becomes employed, huge changes take place inside companies: new approaches and ideas towards hierarchy, time constraints, processes, control, task-sharing, distance working, multitasking, etc.

POTENTIAL EDUCATIONAL CONFLICTS BETWEEN GENERATIONS

There are vast differences between generations. The generations before digital natives cannot fully understand them or share their values, and face difficulties when communicating with them, collaborating with them, and of course educating them. To differentiate between digital natives and other users of digital ICTs, Mark Prensky introduced the concept of “digital immigrants.” They are individuals not born in the digital world, but who adopted many aspects of the new digital age. They are essentially different from digital natives in the sense that they must learn what digital natives grow up knowing as a mother tongue. Like people who learn a foreign language, they have an “accent.” For instance, they print their emails, they read the manual, they go next door to show an interesting website instead of sending the URL. Prensky’s favourite example is the “did you get my email?” phone call.

These differences create a major problem for parents, employers, and educators alike. The relationship between digital native children and their parents is not easy, since conflicts arise from their different approaches, values, competences, and languages. When digital natives get a job in a pre-digital company or institution, they may also encounter huge difficulties, since they have a different vision of what working is, what communicating is, what collaborating is, as well as a different understanding of hierarchy. Last but not least, the generational conflict appears clearly in education when non-digital natives teach digital natives. Teachers do not speak the same language as their students: they speak pre-digital to the digital-speaking generation!

THREE CORE STAKES FOR DIGITAL NATIVES

Accessing new knowledge, networking, and developing collective intelligence seem to be three main aspects of the way digital natives behave.

New knowledge and lifelong learning

The traditional and well-established knowledge no longer suffices to understand the world and to address the major questions of the 21st century. The basic knowledge of the generation Y cannot be reduced to “read, write, count”; knowledge cannot be reduced to the addition of traditional school subjects. There is a tremendous accumulation of knowledge, knowledge that is ever more complex. Edgar Morin, a French philosopher, proposed seven new forms of knowledge to be taught in order to meet the needs of our century:

1. Detecting error and illusion: Teach the weaknesses of knowledge.
2. The principles of pertinent knowledge: Consider the objects of knowledge in their context, in their complexity, in their whole.
3. The human condition: Teach the need for unity and the complexity of human nature.
4. Earth identity: Teach the history of the planetary era, the solidarity between all the parts of the world.
5. Confronting uncertainties: Teach the uncertainties in physics, biology, history, etc.
6. Understanding each other: Teach mutual understanding between human beings; also, teach what misunderstanding is.
7. Ethics for the human genre: Teach the ethics of humanity preparing citizens of the world.

In addition to this more transverse and complex approach to knowledge, the new generation faces the fact that school is no longer the only place to acquire knowledge. Social knowledge and informal knowledge are increasingly more important. At the same time, knowledge is linked with competences. Jacques Delors proposed four pillars for education: learning to know, learning to do, learning to live together, and learning to be. In a knowledge society, knowledge has become an economical good that one can buy, sell, store, exchange, etc. Finally, today's knowledge changes constantly and does so at a very high speed. Students, then, cannot store knowledge and competences for the rest of their life. The digital native has to be a lifelong learner.

Networks

Traditionally, we were used to hierarchical and pyramidal structures in our organizations and in our way of behaving. Societies, companies, and institutions have hierarchical organizational charts; information can be traditionally found through catalogues, directories, tables of content, alphabetical lists, etc. In such organizations, there is usually only one way to access a person or to access information.

ICTs, and particularly the Internet, bring about a radically different organization, which leads to new ways of processing and thinking. Networks are everywhere. A network can be defined as a set of points (pieces of information, persons, web pages, etc.) linked by edges or segments (direct access, a click of the mouse, Internet connection, etc.). In a network we find totally different hierarchies. One can access a point through a myriad of ways. One can directly access people who, before, only the traditional hierarchy would allow access to. One can permanently enrich the network by creating new points and new connections. “Network thinking” is now common, and this is a new challenge for digital natives. Thinking in terms of networks changes profoundly the vision of the world and of human relationships. Almost everyone is now a member of many networks. “Cloud computing”, one of the recent developments in informatics, has been made possible by networks.

Collective intelligence

In decades past, we thought education in terms of individual competences, individual intelligence, individual memory, individual achievement, etc. Today, networking and collaboration through ICTs allow for new ways of cooperating and the development of new concepts, at a collective level. Collective intelligence is a major one. Collective intelligence is not simply the addition of individual intelligences in a group; instead, it includes a kind of added value, a form of intelligence that cannot be reached at the individual level.

Think of what ants can do: individually, they seem to be very limited animals; however, collectively, they become able to achieve very complex and difficult tasks, such as regulating the temperature of their anthill, finding the shortest way from one point to a distant one, carrying heavy loads, etc. They do not do it according to a hierarchical organization; instead, they communicate through pheromone exchanges that make such complex collective activities possible. One can imagine that networking may enable human beings to such collective abilities, going much further than traditional task sharing. The networked society needs and reinforces a collective intelligence, and ICTs make it possible to move towards a global network of collective intelligence. The digital natives, who are both individual and collective, are invited to take part in this collective intelligence.

KNOWLEDGE AND LEARNING FOR DIGITAL NATIVES

As we just saw, knowledge for the digital age cannot be a traditional curriculum consisting only of a list of items, Knowledge today is more complex, more transverse, and evolves very rapidly. Knowledge is not only stored in encyclopaedias and textbooks. Knowledge takes place in the problems to be solved, in the questions to be answered. The teacher no longer has the monopoly of knowledge delivery, since accessing and acquiring knowledge has changed different so much. Internet provides access to a huge amount of information. Information, however, is different than knowledge: Information has to be processed, according to the context and according to the learner, in order to lead to the construction of knowledge. Information has to be classified, sorted out, checked, organized.

Digital natives have an empirical approach to learning that can sometimes irritate the teachers or parents. Rather than a linear access to knowledge, a demonstrative reasoning, and a logical sequence of reasoning, they access knowledge in a random process and through “hypertext” approaches. Digital natives have a different way of concentrating and being attentive. They generally cannot concentrate for a long time and they go from one task to another in a very short time. They are “multitasking,” or performing several tasks at the same time (in parallel, or moving from one task to another). They prefer learning through visual and graphics rather than reading text. They are used to learning through interactivity and games. They have to be permanently connected, since knowledge is in the connectivity. They are used to a huge amount of information (and must learn how to cope with it, sort it out, and control it). They function best if networked, which means that learning is not only an individual activity, but also a collective one.

TEACHING THE DIGITAL NATIVES

We cannot just apply the education of yesterday to the pupils of tomorrow. Students have changed radically and, accordingly, we must find new ways to teach that are appropriate for the new generation. Teaching must take into account the new ways of thinking and processing information of the digital natives. Pedagogy has to be rethought taking into account the constructivist approach, collaborative learning, and networking for learning.

The school of today hardly fits with digital natives. Its organization, its management, the pedagogy, the evaluation as it is carried out, as well as the relationship it establishes between students, teachers, and knowledge – they are at odds with the new students. The school of today is not digital, even if it has integrated quite many new technologies. And the teachers, at least for some time, are not digital natives but digital immigrants. They have to take into account the huge differences between them and the students. Teachers should not need to pretend to be digital natives. They must stick to the core roles and the core values of the teacher, as an organizer of the interaction between student and knowledge, as a knowledge mediator. They have a crucial role, mediated by technology, and this role is increasingly less face-to-face.

Teaching and learning in a digital society does not mean technologizing education. The human relationship between students and teachers is an essential component of the learning process. But this relationship has to take new forms, synchronous and asynchronous, face-to-face or at a distance. Distance education, blended learning, and e-Learning must all take their role and place in the education process.

This also implies transforming pedagogy to invent new forms of it, the pedagogies of the generation Y: pedagogies of time and space. In doing so, we must take into account the possibility of learning “when I want, where I want,” through presence or distance teaching. The diversity of spaces and times can enrich pedagogy. We also have to move from “paper pedagogy” to digital pedagogies. Paper pedagogies cannot adapt to digital tools. We have to invent digital pedagogies. We must invent mobile pedagogies, adapted to the new mobile and nomadic tools. It is not possible to simply transfer the traditional resources to mobile devices. Pedagogical scenarios must be adapted to the specificities of mobile devices and “mobile learning.” We also have to design “social pedagogies”, adapted for collective learning, collective intelligence, collective competences, and collective achievement. The development of networks leads to new forms of pedagogies oriented towards collaborative work and that use all the possibilities of interactions in those networks (such as the web 2.0). We must investigate how social networks can enhance teaching and learning, and we must use the most advanced technologies in order to design “augmented and enriched pedagogies”. A major improvement made possible by ICTs is the possibility of personalization and individualization of teaching. We must invent personalized pedagogies based on the individual learning parameters of each student – pedagogy management systems!

WHICH FUTURE?

In a digital society, the question of digital citizenship is crucial. Education must prepare the citizens of such a society. There is a major risk of digital divide, not in terms of technology or availability of digital devices, but mainly in terms of accessing knowledge and acquiring digital competences.

Currently, some research on digital natives is being produced. It is clear that we need strong research on digital societies, which must explore the changes they imply in learning and teaching.

The questions raised by digital societies and their digital natives are not only technological questions. The main questions are pedagogical and political. They are linked to the values of such societies, to the human dimension of such societies. What is our vision for a digital society? What strategies do we need to implement the core values?

Of course, there will be a new future when teachers will also be digital natives! But the pace of today's changes is so high that we can predict that new core concepts and frameworks will always develop in our society, and therefore a gap will exist between the new natives and the previous generations. Changing generations is now a permanent characteristic of society.

The Director-General of UNESCO, Ms. Irina Bokova, has said: "Digital development affects our way of life and even our way of thinking. This development is not only a technological, industrial, or commercial turning point: it is an anthropological turning point that has repercussions on human life, I would even say on the human spirit. This essentially human dimension is UNESCO's focus."

SUGGESTIONS AND RECOMMENDATIONS

Digital natives are the new citizens of digital societies. Identify and analyse the core changes occurring in a digital society, which are not only technological changes. Analyse the competences of digital natives: competences that they have, competences that they should acquire. Analyse and take into account what knowledge is in a digital society and what knowledge is for digital natives, as well as how it evolves.

Digital societies lead to information societies and knowledge societies. Keep in mind and take into account the human stakes of a knowledge society, and develop the human aspects of digital societies. In order to design teaching and learning strategies for digital natives, we must identify not only their digital characteristics, but also their social, economical, and human characteristics.

Digital natives are involved in networks, collaborative working, and collective intelligence. Teaching and learning strategies must take into account such concepts. Networks should be introduced in schools and schools should be networked.

Digital natives learn in a new way. Launch research projects about the ways in which digital natives learn. What will they learn? Why? How? At what pace? Will they learn alone or in a collaborative way? How can we establish “individual learning parameters” for a digital native?

Digital natives must be taught in a different way. Design and experiment new pedagogical strategies for digital natives, bridging the increasing gap between technology and pedagogy. Involve digital students in the design of appropriate teaching strategies.

Identify the political stakes for digital natives in a knowledge society. What political vision must be developed for a knowledge society and for digital native citizens? What values should be developed in such a society?

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In the «digital society», a new generation is emerging: the «digital natives». Not only they have new and specific digital abilities; they also bring new concepts, new stakes. The traditional school and traditional pedagogies can hardly cope with this new generation. This policy brief aims at considering the question of digital natives, their place in a digital society and a knowledge society, and the new issues that such a generation brings forth, in order to help design appropriate pedagogical and educational strategies for the era of digital natives. Knowledge is changing; lifelong learning is now for everyone; the society is more and more structured in networks; collective intelligence is made possible by technologies and seems natural to digital natives. But there is a risk that the gap will increase between technology and pedagogy. How do the digital natives learn? How to teach them? These are the core questions that we try to address.

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