

## LOOKING AT THE IMPACT OF DIGITAL REVOLUTION IN SCHOOL EDUCATION: CONSIDERATIONS AND INSIGHTS

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### ABSTRACT

**Aim.** The necessary renewal of teaching methods and school practices must take into consideration the technologies of the new generations of students, for whom the supremacy of the book and of the alphabetic writing is no longer given for certain. The presence of digital natives paves the way for educators to increase the digital awareness of young people, primarily through the definition of the terms of a new digital literacy. The reflection on the experiences of applying Web 2.0 tools to the educational context highlights the growing importance of participatory culture and informal learning.

**Methods.** An important role is played by an updated use of constructivist and connectivist pedagogical perspectives. Training courses are considered for the person of the e-learning tutor. Among the specific objectives we have the diffusion of Computer Mediated Communication (CMC), the deepening of Web 2.0 environments, the introduction of cooperative work and constructivist management methods of online interaction, the use of moderation techniques in e-learning environment. These objectives refer to the context of teaching, staff training and school organisation.

**Results.** The collected results are processed using computerised statistical and text analysis systems, which highlight the most central themes and the most evident correlations between the emerging evidence. People who follow training courses of this type show greater awareness of the use and usefulness of technologies. They acquire awareness of the challenges posed by the growth of the young generation of digital natives, in terms of activating a new digital literacy.

**Conclusions.** The research also highlights the difficulties and disappointments encountered in dealing with users and with the school authority. Attending training courses of this type significantly underlines the existence of two distinct fundamental methods of approaching the introduction of new media: one of technologising type, in which technologies are seen indicatively as an end, and one of culturalising type, in which technologies are seen as a means.

**Keywords:** Digital Revolution, School Education, Web 2.0, ICT, Cooperative Work, E-learning, Staff Training, School Organisation.

## INTRODUCTION

The progressive penetration of Information and Communication Technologies (ICTs) in all sectors of contemporary society in developed countries is an increasingly established reality. The introduction of digital media and devices, which took place with the mass diffusion of the Internet, leads to the thought that we are not only going through a new phase of technological development, but that a radical cultural and cognitive revolution is underway (Ortoleva, 2009).

Contemporary society is also referred to as the “information society”, being characterised by an economy largely based on the production, distribution, use, integration and manipulation of information services. The core of the information society is made up of computers and information, as mass production and consumption of information and knowledge excel (Krishan, 2004; Di Sia, 2021a).

We also speak of “network society”, because today’s Internet-based information and communication technologies allow the development of a distributed network organisation. It is a flexible organisation which, however, as its complexity grows, needs regulation and control, directing activities towards specific, hopefully positive and synergistic objectives, oriented towards the good of people (Castells, 2007).

Speaking about “knowledge society”, the role of (techno)science is underlined as a possible key factor in the economic development and governance of developed countries, in relation to the ability to intelligently disseminate innovation and know-how. In the knowledge society, the development of cognitive potential matters in particular, which is also generated outside the traditional academic circuit.

The emergence and convergence of nanotechnologies, biotechnologies and infotechnologies is one of the most significant phenomena of the knowledge society. The potential positive use of these technologies ranges from improving human health to fighting inequalities, but can also include dangerous applications in the military field and in relation to human-machine interfaces (Roco & Bainbridge, 2003; Di Sia, 2022, 2023).

The phase the world is going through is characterised by macroscopic phenomena of social and cultural transformation and by a profound change in the way of acting and thinking in direct relation to ICT. This scenario includes the explosion of the Internet use since the 1990s, with billions of users and ever-increasing penetration rates in developed countries.

The Internet is at the centre of a paradigm shift in the modern structures of the knowledge organisation with a redefinition of roles and authority of the traditional media (cinema, radio, television, newspapers, paper books), i.e. of the entire knowledge industry system as it has been structured since the invention of printing at the end of the twentieth century. The use of typical Web 2.0

applications such as Wikipedia, YouTube, Facebook, see people as protagonists, authors, collaborators (Di Sia, 2016, 2017, 2018a).

The advent of the networked society is weakening the primacy of alphabetic writing and the civilisation of the book, a transition from the “Gutenberg era” to the “Internet era” through virtual communities, knowledge sharing and openness as distinctive features.

The school is a cultural environment historically founded on the book civilisation; considering the current context of change, the training system is called into an unprecedented challenge. In particular, the higher education and university systems are becoming fully aware of this evident paradigm shift.

Taking cultural change seriously into account not only requires teachers to adapt to technological development, but also to rethink traditional teaching methods and teaching practices; it is a transition that questions both the traditional educational setting and the role of the teacher.

### **THE TASKS OF THE SCHOOL**

The appropriate educational innovation responses evolve around changes of the type:

- a) Infrastructural, as an increase in the number of ICT devices, resources and services available in the educational setting;
- b) Contextual, i.e. designed to make functional resources more flexible, allowing alternative solutions to traditional teaching/learning activities;
- c) Curricular, as an update of the curricular objectives to accommodate new cultural tools;
- d) Process focused, to adapt teaching/learning processes and activities to cognitive changes, including the interpersonal communication and knowledge management.

The infrastructural intervention is perhaps the simplest to implement, but by itself it does not guarantee any results; intervening on the context of spatial organisation and school timetable is decidedly less simple.

Until now, educational policies aimed at promoting the knowledge society have mainly focused on:

- a) guaranteeing access to ICT possibly in all educational institutions, increasing the number of computers and providing schools with faster Internet connections;
- b) investing in in-service training for teachers;
- c) promoting the use of digital media as educational resources;
- d) setting up incentives to encourage experimentation and innovative ICT-based solutions.

These lines of intervention focus on creating the conditions for incorporating ICT into traditional teaching practices; however, these types of investments do not always produce the desired results, in terms of innovation and quality of the school service.

Children use the computer and the Internet much more outside than inside the classroom and therefore their ICT skills are developed mainly in other environments, often without organised learning paths. It is therefore a matter of incorporating the use of technology in a multidisciplinary and non-specialist perspective, bringing broadband to schools and facilitating the purchase of netbooks, tablets and similar devices, guaranteeing connectivity in the classrooms, to bring the school setting closer to the conditions that so many students are used to in their homes.

### DIGITAL NATIVES AND DIGITAL IMMIGRANTS

In recent decades, children of the new generations have distinguished themselves by an increased orientation towards technology; their augmented learning style and their multi-tailed mastery of technology have begun to diverge profoundly from the corresponding adult behaviour (Papert, 1996; Mantovani & Ferri, 2008).

This generational gap is also producing macroscopic social and educational problems, which could be overcome at least in part if families and educators had been willing to better understand their children's new educational environment.

Up to 3 years old, children learn almost exclusively in a self-motivated, self-directed, experiential, non-verbal way; they learn by walking, talking, moving, doing things. This is the natural way to learn, and it would be good for parents to help them to teach by themselves what is right and what is wrong, rather than just telling them what is right and what is wrong.

As the child's experiential world is enriched, questions arise that go beyond the direct experience; this increases the dependence on adults and on verbal exploration. Adults don't always cooperate and children's mastery of verbal language is still insufficient; in the extended families of the past, in fact, it was often the grandparents who satisfied this infantile need for answers.

Today in families this need is often satisfied with access to modern technology, towards which the child approaches spontaneously, turning on the TV, a video recorder or a computer to have access to information sources that fuel her/his need to explore the surrounding world. This new possibility constitutes both an opportunity and a risk, because it can lead her/him to new sources of information, but also to bad influences.

In primary school, the way of learning is reversed from home learning; mistakes, as result of experiments from which the child learned, are seen as negative in school and therefore punished. Self-motivated and active exploration is replaced by a passive "being taught", especially verbal, which can lead to disinterest.

Another radical change, typical of the first years of school, is the strong concentration on literacy (knowing how to read and write) and on arithmetic. Today this verbal literature is being transformed through multimedia electronic contents directly available on the Internet. Learning to read and write

early is of course still very important, but it can be done differently from in the past.

The PC's multimedia potential can help to focus on exploration, conveying children to learn to read and write with self-motivation and at their own pace, constituting lasting learning, as connected with positive experiences. The goal of literacy should therefore be used together with the formation of a technological familiarity, finding the way into basic human knowledge through the help of technology.

In this context, some crucial elements are underlined:

- a) The generation gap between "digital" children and "Gutenbergian" adults, focused on the issue of literacy;
- b) The relevance of the active and experiential dimension of learning and knowledge;
- c) The comparison/encounter between spontaneous, self-motivated, multi-sensory learning, based on experimentation, typical of early childhood on the one hand, and hetero-motivated, verbal learning, different from memorising, based on the typical transmission of the school setting on the other.

Today's students represent a generation raised with digital technology, surrounded by computers, video games, cell phones, digital music players, video cameras, etc. As a result, they think and process information fundamentally differently from their predecessors (Prensky, 2001a, 2001b).

The digital natives tend to apply different mental processes in their approach to information from those who belong to previous generations, i.e. the digital immigrants. This contrast between natives and immigrants suggests that technologies constitute the mother tongue of natives, while immigrants find it difficult to speak naturally the language of these technologies, although it is possible that they become proficient in them.

Digital natives are used to receive information quickly, tend to practice parallel and multitasking processes, to look at graphics (images, videos) before the associated text, are constantly online. Many of these attitudes are generally not appreciated by parents and teachers, who have learned textually, proceeding step by step, without usually associating the play with learning.

Current educational systems may therefore be not very effective; digital natives prefer interactivity, seek an immediate response for each of their actions, in order to acquire more information simultaneously; they may therefore be less interested in the traditional activities offered at school.

Teaching methodologies and learning contents could therefore be proposed in more compatible forms with the minds of digital natives, through new teaching paths which clearly do not eliminate the learning of basic and specific skills, but which include a greater interactivity in the lessons to encourage more interest and involvement.

Other distinctions followed between digital natives and digital immigrants, which emphasise the differences in living immersed within the new technological environment (Veen & Vrakking, 2007).

The generation that has found in the computer a privileged window on the world shows distinctive traits in learning, such as learning through screens, icons, sounds, games, virtual navigation of the web, remaining in constant telematic contact with the peer group.

At the origin of the various positions on the thesis of generational division there would be those who were born after 1980 in the north-western world, the so-called "Millennials" and the "Net Generation" category; compared to the concept of Millennials, that of Net Generation appears closer to the Prenskian category of Digital Natives, if we underline the difference considered most important for this new generation, namely the frequency and ability to use the Internet for formal and informal learning purposes. This suggests the idea of a marked generational fence that will make increasingly significant the differences between the attitudes of young people and those of adults (Strauss & Howe, 2021; Tapscott, 2008; Oblinger & Oblinger, 2005).

Similar or related categories have proliferated over the years: New Millennium Learners, Screen Generation, Digital Learners, Echo Boomers, Net-agers, The Next Great Generation, Generation @, among the best known (Palfrey & Gasser, 2010).

The used terms suggest the idea of a digitised and technologised generation as opposed to those that preceded it; this would make it important for third millennium pedagogy to consider ICTs as a relevant part of the environment in which students live, developing a knowledgeable teaching of their practices. The indicated categories have many aspects in common, but also distinctive features.

The date of appearance of the natives differs according to the moment in which the conditions for diffusion and use of technologies comparable to those reached in the United States at the beginning of the 1980s occurred in a given society.

There are also gender differences: boys tend to use the computer at home for more time and in particular to play, while girls use it more for communication; boys also make more advanced use of applications, also taking an interest in programming, while girls seem to pay more attention to the communication opportunities also offered by mobile phones, emails and virtual communities (oecd.org/education/ceeri).

From studies conducted involving the EDUCAUSE Center for Applied Research (ECAR), Pew in North America, JISC (Joint Information System Committee), BECTA, the Oxford Internet Institute, university studies in Australia and South Africa, what emerges is a non uniform use of technologies by young people, even in relation to the styles with which they approach them (Jones, Ramanau, Cross, & Healing, 2010).

The negative aspects of the digital natives are also discussed, those for which the continued interaction with technologies can lead to disadvantages and weakening; the learning abilities of young people would be compromised by a general inability to gather information with discernment (Carr, 2011).

Many young people of the current generation consider news taken from search engines as absolute truth and think that their ability to copy and paste a

well-formulated thought or opinion authorises them to appropriate it. Furthermore, the use of online resources takes away inexperienced students from the support of their teachers and inclines them to make poor judgments and avoid complex issues ([brookfieldinstitute.ca/wp-content](http://brookfieldinstitute.ca/wp-content)). Many teachers complain that digital technologies contribute to increase the disengagement and alienation of young people from formal institutions and activities.

A conclusion supported by various researchers is that, despite high levels of use of some technologies, such as email, recreational programmes, social networks, free Internet browsing, only a minority of students engage in more complex activities, such as assembling a computer, creating own content or producing multimedia for the web; there is therefore a difference between those who make expert use of the computer and those who use it generically, to play, search for information or socialise (Nasah, DaCosta, Kinsell, & Seok, 2010).

The data therefore disproves the strong assertion that digital natives possess sophisticated skills and knowledge; it remains to be clarified whether being native is a real advantage for learning technologies.

### **ON DIGITAL LITERACY**

The first practice of digital natives is the extensive use of technologies in ways that express their identity.

The second practice can be considered a switchtasking rather than a real multitasking. Educators often mention this feature as the first problem of young people; it is a common experience in academic courses, where the presence of numerous students who pass the lesson with their eyes looking at the screen of their laptops or tablets without ever looking at the teacher.

As a third practice, young people expect that materials such as photographs, videos or texts circulate exclusively in digital format, and that all these materials can be shared and made available to others. Associated with these changes there may be various problems, related to security, privacy, intellectual property, information quality, overload information (Di Sia, 2019).

### **WEB 2.0 IN THE EDUCATIONAL CONTEXT**

The technological environment in which the world of education operates is becoming increasingly complex, offering new opportunities, but also giving rise to new comparisons and challenges. In 2010 it had been suggested (De Freitas & Conole, 2010) that there existed five technology trends intended to have a significant impact on education:

- the move towards distributed network technologies;
- the emergence of context- and location-aware devices;
- different forms of possible representations and settings, richer and more differentiated;
- the trend towards the use of more adaptive mobile devices;
- a global, distributed and interoperable technological infrastructure.

New practices have emerged:

- sharing of images, videos and documents;
- new tools for content production, communication and collaboration (blogs, wikis, micro-blogging services and social networks);
- opportunity to interact in new ways through immersive virtual worlds (Second Life).

This has helped to increase users access and engagement proportionally; the web services have become cheaper, faster, increasingly based on wireless technology. Advances in access and speed have been accompanied by parallel advances in software development and data management.

The debate on the application of Web 2.0 technologies to the educational context is centered on the notions of evolution and transformation, in order to improve formal educational contexts and decrease the boundaries between the different categories of learners (student, adult in training, informal learner, self-taught). Attention shifts to new paradigms of learning and knowledge construction, but also to fundamental issues that will influence educational institutions and practice in future years.

Learning theories have been grouped into three categories:

- Associative, with learning as an activity through structured tasks;
- Cognitive, inherent in learning by understanding;
- Situational, related to learning as a social practice.

Social tools and Web 2.0 interactive environments enable the learner to adopt exploratory and creative attitudes, without neglecting the social dimension of planning and governance.

Constructivism emphasises the importance of the learner being actively engaged in the learning process. The cognitivist approach is mainly concerned with the architecture and mapping of knowledge, while the theories of constructivism and distributed cognition emphasise the distributed and networked nature of learning in the context of physical and virtual spaces.

The methods and tools of Web 2.0 can help the educational process to overcome the classic constructivist theories, thanks to the movement that passes from isolated individual activities to interactive exchanges within a community of learners who collaborate with each other (we also speak of collaborative constructivism, or connectivism) ([discovery.ucl.ac.uk/id](http://discovery.ucl.ac.uk/id)).

### **ON THE CHANGE OF ROLE OF TEACHERS**

By age, most teachers are digital immigrants, but their skills and competences should not be underestimated; a number of new roles have been suggested that teachers should assume in online learning environments: amplification, wayfinding, sensemaking, aggregation, filtering, modeling, persistent presence ([downes.ca/files/books](http://downes.ca/files/books)).

Getting the majority of teachers involved will require different approaches, more strategic institutional coordination, the development of support mecha-



nisms for educational staff, different strategies in terms of instructional design, support and assessment of learning.

The reasons that explain this situation are in particular:

- there is an absence of appropriate incentives to use technology in the classroom, and in general to be involved in innovation involving technology;
- the dominant culture in the teaching profession is that of an applied practice, which does not rely much on the evidence resulting from pedagogical research to identify good teaching methodologies and strategies;
- teachers lack not only personal experience, but also the ability to foresee what technology-enhanced teaching might become.

Key success factors turned out to be:

- Structuring and guidance for teachers: among the most important factors there is the need to ensure that teachers are provided with appropriate scaffolding and support on how Web 2.0 tools are incorporated into courses, provide guidance and support on the planning of the courses, on the nature of the activities and on the role of the teacher.
- Strategic alignment: another crucial area is ensuring that appropriate institutional strategies are in place to support change.
- Understanding the student's experience: a careful consideration of the students point of view is essential, particularly considering their motivation and commitment.
- Appropriate support structures: this involves ensuring easy access to materials, with clear ideas about the structure and role of the online environment, and that response actions are planned to problems that may arise.
- Incentives and rewards for staff: it is crucial to ensure that staff are fully aware of the reasons for introducing new technologies.
- Sharing of good practices: ways to share good practices and enable teachers to adopt more science-based approaches should be available.

### **ON ICT TRAINING OF SCHOOL STAFF IN ITALY**

From the late 1990s to the end of the first decade of this century we witnessed a great diffusion of new media in Italian society, and also in schools. In the 1999 IARD institute survey, only 8.6% of primary teachers, 15.6% of lower secondary teachers and 36.6% of higher secondary teachers said they had surfed the Internet for matters relating to teaching in the three months preceding the survey. These percentages rose respectively to 86.6%, 89% and 92% in the 2008 survey.

The training projects in Italy followed a logic progressively less centered on technological skills and more aimed at educational innovation, but at the same time the available resources have decreased, involving ever smaller numbers of teachers and students (Marconi, 2010).

About the period from 1997 to 2005, The Educational Technology Development Program (PSTD), of the Ministry of Public Education, was a four-year

project (1997-2000) with the primary objective of equipping Italian schools with multimedia and telematic tools.

The macro objectives of the PSTD were:

- a) education of students in multimedia and communication;
- b) improvement of the effectiveness of teaching and learning disciplines;
- c) improvement of teachers professionalism.

The PSTD consisted of two actions:

- I) Project A, aimed at providing teachers with the tools to:
  - receive an initial basic training on multimedia;
  - study the application possibilities of multimedia in teaching;
  - examine teaching materials and develop their own;
  - cooperate with other teachers of the school and/or of other schools;
  - involve classes or groups of students in non-systematic activities requiring the use of multimedia.

Therefore, project A concerned an initial literacy action, which was in practice a distribution of multimedia stations to the requesting schools, together with basic training actions relating to the didactic use of multimedia.

- II) Project B, with the aim of promoting the introduction of multimedia in normal curricular activities and therefore aimed at schools with a certain number of already trained teachers and able to formulate a specific didactic hypothesis. The action concerned the creation of laboratories, also connected to the network, equipped with multimedia and telematic devices and programs.

Over 20,000 schools were involved (13,304 for project A, 11,628 for project B), purchasing 250,000 computers; a ratio of 1:35 was reached for primary and lower secondary school, and 1:10 for higher secondary school. According to the Ministry, around 500,000 teachers were involved in training courses, 25-30% of whom eventually engaged in significant educational actions.

The project envisaged the possibility of involving students in small groups and also for individual use of laboratories, all reasonable and acceptable conditions, provided that an accurate return of the results was obtained, which however did not achieve the aim. Monitoring was then carried out, but it arrived too late to allow "in itinere" adjustments to the project; this led to critical judgments ([edscuola.it/archivio/statistiche](http://edscuola.it/archivio/statistiche); Barbieri, 2013).

The PSTD was followed in the following years by two national training plans for IT and methodological literacy of teachers, the ForTIC 1 plan (2002-2005) and the ForTIC 2 plan (2006-2008). Unlike the PSTD, this time a different involvement was envisaged for the preparation of basic materials and distance learning (INDIRE) and for monitoring and evaluation (INVALSI) ([indire.it](http://indire.it); [invalsi.it](http://invalsi.it)).

ForTIC 1 included three training paths:

- Path I: in fact, the opportunity to obtain the ECDL certification, often by purchasing the skill card at the expense of the school or at a reduced cost, prompted many teachers to favour a formula to the detriment of the didactic and professional part. This aspect was much criticised, because

the technological contents of the ECDL modules appeared far from a professional teaching context. Path I involved around 15% of Italian school teachers (150,000).

- Path II: it was composed of modules relating to teaching and technologies.
- Path III: it was related to the management of technological infrastructures (networks and websites).

Paths II and III had to provide for the selection of expert teaching staff: figures II as experts in teaching with technologies, figures III as network administrators and webmasters, in anticipation of a future professional placement as system figures, which then did not happen.

The contents of paths II and III were prepared at the regional level (in Lombardy, for example, the universities and some higher education centers were involved). In path II, just over 1% of the teachers were involved (13,000), in path III less than 1% (7,000).

The lack of permanent recognition of system figures has ultimately dispersed the skills developed in schools. Furthermore, considering that the available resources did not allow more than a third of the teachers to be literate, it was necessary that in later times the schools themselves, through the system figures, trained the remaining two thirds, but this was not foreseen.

The ForTIC 2 plan had as its purpose the construction of a didactic-pedagogical area created by merging paths I and II of the previous edition. For neophyte teachers, self-training was envisaged on entry through an e-learning platform or on CD. The amount of used money has been low and therefore the reached numbers were about a tenth of those achieved with the previous plan ([edscuola.it/archivio/norme/circolari](http://edscuola.it/archivio/norme/circolari)).

It can be said that the majority of Italian teachers between 1997 and 2008 had the opportunity to practice with computers and the Internet; however, it is reasonable to argue that 80% of Italian teachers did not receive a basic technological literacy that can be defined as appropriate in the indicated period.

With regard to teaching skills, considering realistic the monitoring numbers, 25-30% of the 500,000 teachers were involved in significant experiences, i.e. less than 15% of Italian teachers. In the following decade, some of them consolidated their skills with path II of ForTIC 1 and with ForTIC 2. Adding to these teachers those trained in subsequent actions, which however did not involve many of them, we do not reach 5% of the teaching staff.

Severe judgments have been expressed on the ForTIC models, speaking of confused management, without pedagogical certainties, with learning and training materials collected in a disorganised way, and the platform for their use not intuitive and confused.

About the period from 2005 to 2013, the projects following ForTIC have been on a smaller scale and characterised in particular by a statist logic and collaborative strategies, assigning centrality to the application of technology to teaching.

The training courses were based on methodological assumptions such

as edutainment, individualised learning, collaborative learning, learning by doing, inductive learning and reasoning on content, cognitive, metacognitive and emotional-motivational scaffolding, flexibility with respect to the use of the training course.

The planned activities were individual self-learning activities based on teaching strategies such as practice, simulation, problem solving, web quest, game, exercises supported by a moderator in a dedicated environment, sections dedicated to discussion and comparison, divided by disciplinary areas.

The “Digital School Plan” followed, in line with the previous ones and with the more targeted objective of transforming classes into laboratories: LIM Action (Multimedia Interactive Blackboards (MIBs)), Classes 2.0, @urora, Beyond @urora, HSH@Network.

Less than 10% of primary school classes, about 22% of lower secondary school classes and about 5% of higher secondary school classes were provided with MIBs. This action has also been criticised, indicating the devices to schools in insufficient quantities to effectively modify or even enrich the teaching of all classes ([crescenziogallo.it/PON/D4-FSE-2011-196](http://crescenziogallo.it/PON/D4-FSE-2011-196)).

In the following years, and in particular in the period from 2020 to date, with the need to deliver home-based learning, funds have been allocated to equip classrooms with IT tools (especially at university level), but the weaker part of teachers, especially those under contract, has not been financially helped in relation to the purchase of devices for working from home (Barbieri, 2013; Di Sia, 2021b).

## CONCLUSION

The transformations that are taking place in today’s digital society are leading the school and their operators to reconsider their role. The necessary renewal of teaching methods and school practices requires consideration of the technologies of the new generations of students who are digital natives.

The experiences of applying Web 2.0 tools to the educational context is highlighting the growing weight of participatory culture and informal learning, and confirming the potential, but also the critical aspects of a transition that questions the traditional educational setting and the role of the teacher.

In past years, the updating and training interventions of school structures and staff in the field of Information and Communication Technology (ICT) have had technologising approaches, leading to an appreciation of technology by teachers, but rarely bringing it into the classroom. In this direction, an important role is played by an updated recourse to constructivist and connectivist pedagogical perspectives.

Among the projects carried out and in progress there are training courses for the professional qualification of the figure of e-learning tutor, with repercussions relating to training, teaching and organisational practices in educational institutions.

In general, people who follow training courses of this type demonstrate

in the long run a greater awareness of the use and usefulness of technologies, forming a group open to innovation and didactic experimentation, becoming aware of the challenges posed by the younger generations of digital natives, in terms of activation of a new digital literacy.

The attendance of training courses of this type has highlighted the existence of two distinct fundamental methods of approaching the introduction of new media: one of technologising type, in which technologies are seen indicatively as a goal, and one of culturalising type, where technologies are seen as a means.

There does not seem to be a generational line that clearly divides the younger generation from the older ones in the use of technology; one should therefore not speak of discontinuity, singularity, substantial difference. People adopt technologies to varying degrees, with different rhythms and according to age.

Web 2.0 tools have characteristics that can be exploited in the educational context in support of a variety of pedagogical approaches, using them for innovative approaches to support learning. However, it is necessary to address some critical issues, common to various situations in the field of education.

Web 2.0 tools offer new opportunities for learning, complementary to the more general shift towards constructivist approaches that dominates the current educational address. They offer a range of new ways in which knowledge can be represented, discussed and shared, as well as a variety of pathways to support shared learning activities.

However, there is a set of critical issues associated with the attempt to incorporate such practices into institutional education systems. The promotion of Web 2.0 approaches challenges the traditional forms of assessment and validation mechanisms currently in use in the school.

Empirical evidence is emerging that students use of technology and digital media has implications for how they learn, and more generally for their social values and lifestyles. Despite growing acceptance levels, a gap appears to remain between Web 2.0 technologies and current education systems or teaching practices (Di Sia, 2018b, 2020).

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