

## DIGITAL SKILLS AND PROFILE OF EACH GENERATION: A REVIEW

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### ABSTRACT

The technological development is changing, involving and conditioning everyday life, making it faster, hyper-connected and immediate. New technologies can have a double outcome: positive, given that they take on the role of facilitator, or negative, when people tend to make excessive and unconscious use of it or technology repeatedly replaces human beings. Today, therefore, new skills are needed for the entire population, the digital skills, both in everyday life and in the labour market.

These are transversal skills that allow human beings to choose the right technologies: to research, analyze data and choose reliable information from those that require further study, to check and verify the health of people, to interact with different and distant subjects in the world, to improve school learning, ... The plurality of people that this technological development is involving allows us to analyze the population in terms of generations, from Silent Generation to Alpha Generation. In this article we want to present a literature review within the Google Scholar database in the last 10 years using the terms digital skills and different generation.

This preliminary research allows us to analyze the different theories that make for the Digital Skills a definition, dimensions and evaluation model, and the generational profiles in order to have a shared and common theory among the different professionals.

Having an accurate background of digital skills and generational profiles favours the inclusion of all people, and the improvement of the quality of life in the creation of psycho-pedagogical projects and in the design of technological products.

**Keywords:** digital skills; cohorts; different generation; digital literacy; technological interaction

### OBJECTIVES OF THE INVESTIGATION

Nowadays, technological development is changing, involving and conditioning everyday life, making it faster, hyper-connected and immediate. The introduction of new technologies in everyday life can be positive, if they take on the role of facilitator, or negative, if people tend to make excessive and unconscious use of it or the technology repeatedly replaces human beings. The entire pop-

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ulation needs new skills, digital skills, which allow people to make positive and conscious use of various technologies. They are transversal skills that allow the human being to choose the appropriate technologies: to search, analyze data and choose reliable information from those that require further study, to check and verify the health of people, to interact with different and distant subjects in the world, to improve school learning, ... The fields of action in which technologies can be applied touches different contexts and a vast plurality of people. This allows us to analyze the population in terms of generations, from Silent Generation to Alpha Generation. Therefore, the aim was to study and analyze the most complete theories about digital skills and the generational profiles of the entire population. These objectives were chosen in order to have a theoretical and shared overview in order to carry out a profound analysis on the interaction between each generation and the different technologies. It is also believed that the multidisciplinary nature of this topic requires a theoretical approach shared by all the various professionals working in the sector.

### **SAMPLE AND / OR PARTICIPANTS**

The research was carried out through a literature review in the Google Scholar database between January and March 2019. We have analyzed the papers published from 2009 to 2019 in the language of Italian and English.

### **METHODOLOGY AND / OR INSTRUMENTS USED**

A search of national and international literature was conducted on the topic “generations and technologies” that arises from a question: How do the various generations perceive human-technology interaction? This question was solved in two sub-questions: do the characteristics of each generation affect the respective perception? Does the digital skills possessed by each generation modify perception?

These questions were attempted to respond with two researches: a preliminary one, which would allow us to focus more precisely on the field of research and bring out the underlying theories, and a more complete and focused one, which would bring out the interaction between generation and technology. Both researches were carried out through a literature review in the Google Scholar database between January and March 2019. In this paper we will illustrate the results regarding the preliminary research that was done by choosing two keywords: “digital skills” and “different generations”. In addition, criteria for inclusion and exclusion of publications have been developed: the research was carried out by including the articles with the two keywords: “digital skills”, the definition, the dimensions and the competence assessment model; “different generations”, the minimum of 4 generation’s classification and comparison, the presence of common indicators for each generation. On the contrary, publications different from Italian and English have been excluded, contents published before 2009 and articles not available free of charge.

### **RESULTS**

The selection made on the basis of the criteria and the analysis of the contents of the data present in the publications, has led to the inclusion of n° 6 articles that have been divided according to the keywords in this way: n° 2 publications for “digital skills” (Table 1), n° 4 for the “different generation” (Table 2).

Table 1. Literature Review for "digital skills"

Authors	Title	Year of publication
A. Calvani, A. Fini, & M. Ranieri	Valutare la competenza digitale. Modelli teorici e strumenti applicativi.	2009
S. Carretero, R. Vuorikari & Y. Punie	DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use.	2017

Table 2. Literature Review for "different generations"

Authors	Title	Year of publication
S. B. Berkup	Working with generations X and Y in generation Z period: Management of different generations in business life	2014
T. Hernaus & N. Pološki Vokic	Work design for different generational cohorts: Determining common and idiosyncratic job characteristics.	2014
D. Velički, V. Velički	Characteristics and particularities of educating the net-generation	2015
T. Botteri, G. Cremonesi	Millennials e oltre! Nuove generazioni e paradigmi manageriali.	2019

Regarding the analysis of the publications in table 1, there are two research groups that have been analyzed Calvani, Fini, Ranieri (2009) and those of Carretero, Vuorikari, Punie (2017). For both publications the definition, the dimensions and the competence assessment model were analyzed (Table 3).

Table 3. Digital Skills: definitions, dimensions and competence assessment models

Authors	Definitions	Dimensions	Competence assessment models
A. Calvani, A. Fini, & M. Ranieri	Digital competence is a framework of articulated competences that include not only the possession of procedural skills, but also more complex components, such as the ability to analyze and evaluate data, represent and solve problems, explore unknown technological contexts, establish collaborative synergies between multiple subjects.	Three dimensions: - Technological dimension: basic skills and notions that allow exploring, evaluating, exchanging information and knowing how to choose appropriate technologies in a flexible way; - Cognitive dimension: being able to read, select, interpret and critically evaluate data, abstract models and information considering their	Two different types of tools: - Instant DCA: quantitative testing; - Situated DCA: tests located in real contexts.

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		relevance and reliability; - Ethical dimension: interact adequately in cyberspace through technology, protecting one's own person and others.	
S. Carretero, R. Vuorikari & Y. Punie	Digital skills are a continuum that goes from the acquisition of instrumental skills to the development of strategic skills, which allow the person to be able to distinguish the stable frame of reference from those that are more volatile or customizable components.	Five dimensions: - Information and data literacy; - Communication and collaboration; - Creation of digital content; - Security; - Solve problems.	The levels of mastery of the dimension are 8 and are grouped into 4 categories: - Base: level 1 (with someone's help), level 2 (autonomously); - Intermediate: level 3 (alone and solving problems), level 4 (independent, according to needs and solving well-defined and unsystematic problems); - Advanced: level 5 (promotes support for others), level 6 (according to one's own needs and those of others in complex contexts); - Highly specialized: level 7 (highly specialized), level 8 (very advanced and super specialized).
Sources: (Calvani, Fini, Ranieri, 2009), (Carretero, Vuorikari, Punie, 2017)			

The researchers Botteri and Cremonesi (2019) believe that today there are 6 generations: Silent Generation or Traditionals (born 1925-1945), Baby Boomers (born 1946-1964), Generation X or Busters (born 1965-1980), Generation Y or Millennials (born 1981-1997), Generation Z or Digital Natives or Founders (born 1997-2010) and Alpha Generation or Screenagers or Net-generation (born after 2010). From the publications of Berkup (2014), Hernaus and Pološki Vokic (2014), Veli ki and Veli ki (2015), Botteri and Cremonesi (2019) have noted that for each generation it was analyzed and typed on the basis of age first and then based on the historical period, personal characteristics, ethics and values, work preferences and current situation. (Table 4).

Table 4. Differences between generational cohorts

Generation	Historical period	Personal characteristics	Etics and Values	Work preferences	Current situation
Silent Generation or Traditionals	Great Depression and World War II	-want to feel needed -strive for financial security -“Waste not want not” attitude (Conservatism) -simplicity, Patriotic, Patience, -high inter/intra-personal skills	-traditional family values -understands the nobility of sacrifice for the common good -loyal to employers and expect the same in return	-enjoy flexible arrangements so they can work on their own schedule -believe promotions, raises, and recognition should come from job tenure -measure work ethic on timeliness, productivity, and not drawing attention -mn typically worked while women stayed home to raise children	-wealthiest generation -majority are retirees
Baby Boomers	Civil rights movement, feminist movement, Environment movement Cold War murder of JFK, Robert Kennedy and Martin Luther King first man on the moon Vietnam War Protest and sit-in, Watergate Nixon’s resignation	-assertive, casual, ambitious, individualist, experimentalist, independent -optimists, but distrust of the government -promotion of social causes	-strong orientation towards work, career and political and civil commitment -respect for family and religion	-“Workaholic”, they hold positions of prestige, they have high incomes and great capacity to save -professionalism is measured in hours worked and little in productivity -team worker with co-workers -medium-high education	-generation with more people -economically launched group -“Empty Nesters”
Generation X or Busters	HIV disease End of Cold War and Vietnam’s War	-ambitious, self-sufficient, pursuing personal development,	-seek stability -spirit of adaptation and responsibility -distrust in	-informal and friendly -freedom and work flexibility -place where you	-presence of single parents

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	Watergate Nixon's resignation Computer and MTV Fall of the Berlin wall Reaganism	organized and multi-tasking, open to dialogue, tolerant towards differences, flexibles but realistic, and rejecting the rules -defined as "nothings", but they need to control their lives	institutions, it's believed in people and not in the family -children must be self- sufficient	can always learn -more quality, less quantity -communication regardless of position or title
Generation Y or Millennials	Technologica l development Oklahoma bombing OJ Simpson case Death of Princess Diana Y2K Terrorism suine flu	-the "mummy's boys" leave home late in life -concentrated on the present, hyper- connected, receptive and multitasking and possessing profound technological knowledge -have a visual approach rather than a textual one -accept diversity and work together -achieving goals in a short time and with people helping them -ambitious, optimistic, impatient, entrepreneurial, individualistic, informali -short attention and immediate gratification -be unique	-attentive to the image -they buy not to have, but to be -everyone wins!	-accustomed to insecurity -the job is not aimed at salary, but they prefer to be remembered and make a difference -curious and open to new things -work is an opportunity to learn -work to live, rather than live to work

<p>Generation Z or Digital Natives or Founders</p>	<p>11 September 2011 Great recession Terrorism suine flu hurricane Katrina iPod and Facebook World Wide Web</p>	<p>-innovative choice -highly connected to communicate information (status on FB and/or Twitter) and little concern for privacy except for money -immediate and quick gratification -independent -they suffer from the fear of being excluded</p>	<p>-value to the family and to the elderly, but they challenge the traditional roles -unstable couple relations</p>	<p>-education and training through the use of social media -no team worker, but they will be very self-critical, they will process information at light speed thanks to cunning -turning passion into work</p>	<p>-multiracial -they will have to resolve the environmental, social and economic deterioration</p>
<p>Generation Alpha or Screenagers or Net-generation</p>	<p>Today</p>	<p>-they pass the evolutionary stages -the most experienced in technology -they know perfectly how to use technology -possible dependence on the screens -time spent on devices is greater than social time -virtual friendships -feeling of loneliness, despite the hyper-connection</p>	<p>-</p>	<p>-longer students and independent adults later</p>	<p>-look after their parents for a longer period of time -particularly demanding consumers -particularly unfaithful customers</p>

Sources: (Berkup, 2014), (Hernaus & Pološki Vokic, 2014), (Velički & Velički, 2015), (Botteri & Cremonesi, 2019)

### DISCUSSION

Today the digital skills are a necessary skill for everyday life since they are applied in every social context. The diversity of social contexts makes it emerge a multiplicity of professionals working in the technological field. This multiplicity of figures increasingly requires a common and shared theoretical dimension as each professional tends to give meanings to this mediator. From the analysis of all the publications it is believed that the two most complete theories are those of the scholars Calvani, Fini, Ranieri (2009) and those of Carretero, Vuorikari, Punie (2017). For both research groups the definition of digital skills is very dynamic and multiple since it is the union of many different skills. These skills can be divided into basic or procedural skills and more complex skills. Basic skills mean: exploring, searching, exchanging information, data, ... Instead, the scholars for more complex skills tend to mean: the ability to select, interpret, evaluate information, technological devices, create technological content, ... Calvani, Fini and Ranieri (2009) tend to divide these skills into 4 different dimensions: the technological dimension, the basic notions in the choice of technologies in a flexible way; cognitive dimension, access, evaluation and critical selection of data; ethical dimension, the ethical and correct use of technologies; the integrated dimension, the creation of knowledge thanks to the use of technology. The second contribution concerning these digital skills is that of DigComp 2.0 / 2.1 prepared by Carretero, Vuorikari, Punie (2017). Their model tends synthetically to bring out 5 different dimensions of competences: literacy on information and data; communication and collaboration; content creation; safety; problem solving. Both contributions have included the ways in which these skills can be evaluated and a scale of mastery of competence's dimensions. It is in fact believed that knowing how to identify the current development area of the person and his / her already possessed competences allows us to design inclusive paths and products that promote the potential development of the human being in these technological competences favoring his quality of life and its centrality (Vygotskij, 2008). Being close to Vygotsky's statement, it was decided to focus on the different generations present and socially active. Initially the most current macro-classification in the literature was analyzed. Later it was an intergenerational comparison based on elements shared by different authors. From the analysis of the various studies, summarized in Table 4, these differences are clear: the conservative, patriotic Silent Generation, strongly anchored to family values and centered on job satisfaction, on sacrifice for the common good, on the centrality of man (the man works, while the woman stays at home to look after the children), then moves on to the Baby Boomers who despite being born a few years later tend to be much more ambitious, individualistic and independent of their predecessors. They are "Workaholics", professionalism is measured by the amount of work hours and not productivity. This last attitude is very different from Generation X or Busters, which tend instead to prefer quality over quantity of work; they also appear to be more unstable both in work and in the family as they pursue personal development, rejecting the rules and trying to gain control of their lives. The perceived instability experienced by this generation turns into insecurity for Generation Y or Millennials, who prefer to be centered on the present, are more curious and open to new things, see work as fun and want to stand out from others. They are the first generation that tends not to deepen their choices and to request immediate gratification. In the wake of this generation follows the Generation Z or Digital Natives or Founders, who want to turn their passion into a job, they too seek immediate gratification and are highly connected despite suffering the fear of being excluded. They are independent, self-critical and suffer from social instability in couple relationships. Finally, we come to the analysis of the studies carried out with Alpha Generation or Screenagers or Net-generation, which pass all the evolutionary stages, spend more time on devices than social and / or family time. Adult independence will be considerably delayed due to the many years they will be studying. They have a greater sense of solitude



despite the hyper-internet connection compared to the previous generation. Some scholars, regarding this generation, speak of a possible dependence of the screens.

## CONCLUSIONS

This preliminary research has fulfilled the set objectives, since it is believed that this article allows different professionals to have a broader theoretical vision. The two theories for digital skills allow to have an answer to the theoretical-methodological emergency in this field of investigation where the multidisciplinary of the professional figures involved is very present. In fact, there are both professionals in the humanities and technical-scientific areas. In the wake of this, having a macro and a micro-classification of the population in the light of generational profiles helps the various professionals in the design of training courses or products that start from the potential of each age to improve their quality of life. Knowing the potential of people favors the success of every design, since the centrality of the person is the fundamental node. This highlights the analyzed studies given that the differences of each generation influence and considerably modify the methods of approach and interaction in social contexts. Even more so in the technological field where the purposes of interaction are multiple and different.

It is believed that this research represents a starting point since we have already been working on a research centered more on the perception that each generation has regarding technological development. Having a clear understanding of the theoretical dimension regarding digital skills and generational profiles, allows us in in-depth research to observe whether this perception is influenced by the digital skills possessed and the respective generational profile.

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