

# Fostering Generation Z digital skills' development: implications for Universities and HR

Leonardo Caporarello<sup>1,2</sup>, Beatrice Manzoni<sup>1,2</sup>, Federica Cirulli<sup>2</sup>,  
Federico Magni<sup>3</sup>

<sup>1</sup> SDA Bocconi School of Management and Bocconi University, 20136 Milan, Italy

<sup>2</sup> BUILT, Bocconi University, 20136 Milan, Italy

<sup>3</sup> Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong, China

leonardo.caporarello@unibocconi.it

**Abstract.** Individuals belonging to Generation Z are also known as “digital natives” because the internet already existed when they were born (1997-2010). This creates the common belief that not only do they live online, but they also have strong digital skills. However, a dearth of scientific research on the subject puts this widespread belief into question. With this research, we aim at exploring Gen Zers' digital skills. We collected data from 1,000 Italian secondary school students and we found that they possess excellent mobile, social and operational skills. Moreover, they have a good capacity to search for information and use online environments. On the contrary, they lack creative skills. This offers implications for Universities in redesigning their educational curricula, and for HR in companies in crafting new jobs and internal training on digital skills.

**Keywords:** Gen Z, iGen, digital natives, generations, digital literacy, digital skills, Universities, HR

## 1. Introduction

Individuals belonging to Generation Z (born 1997-2010) are also known as iGen or the Digital Natives, because Internet and smartphones already existed when they were born [1]. They are the first generation born into an integrated and globally connected world. They are in constant contact with people, mostly through social networks and instant messages, rather than emails and direct contact [2]. Technology facilitates their lives, solves their problems and provides them with access to relevant information and people [3].

Gen Zers seem to have an edge in the job market, as they are more familiar with the digital world than previous generations [4], and nowadays digital skills are increasingly recognized as a critical success factor in education and in the Professionals setting [5, 6].

However, existing research suggests that this is probably a false myth about Gen Z: even if their life is based on technology and Internet, they do not have so solid digital skills [7, 8].

Moreover, being the newest generation, Gen Z is also the least studied one, in particular when it comes to the youngest members of the cohort (born after 2000 and still in secondary schools).

With the current research, we aim to assess Gen Zers' digital literacy, answering the following questions. Are digital natives proficient in terms of digital skills? What are their most and least developed digital skills? Given this, how should Universities and HR approach their development?

The paper is structured as follows. In the next section, we review the relevant literature about Gen Zers' digital literacy and skills. Afterwards, we present the methodology used to test the research questions, including the study context and sample, followed by the findings section. Finally, we discuss the results and their interpretation together with concluding ideas, limitations, and proposals for future research.

## **2. Digital skills and digital natives**

Today, almost every aspect of human life depends on digital technologies, the Internet in particular. Emerging new digital skills are necessary for the digital natives to face the challenges of this society. There is not yet a common definition of digital skills, even if these skills are labelled "Twenty-first Century skills" to indicate that they are more related to the current economic and social developments than those of the past century [9]. One of the first digital skill's definition, as given by the European Parliament, is the ability to know how to use the information in society's technologies for work, leisure, and communication with confidence and a critical spirit [10].

According to van Dijk [11], digital skills are medium-related and content-related, medium-related skills including operational and formal skills. The first lays in the ability of an individual to operate the digital medium, while the second refers to the ability to handle the formal aspect of the medium. In addition, content-related skills included informational, communication, content creation, and strategic skills. Later, van Dijk [12] considered communication skills as the ability to "create online identities". Strategic skills, in turn, were viewed as those that assist people in achieving their goals with the help of the digital medium.

At the same time, in their paper, Perez-Escoda et al. [13] saw digital skills as the set of competencies including information, communication, content creation, safety, and problem-solving. Unlike van Dijk [12], Perez-Escoda et al. also emphasized the aspect of safety. As per their report, safety skills presuppose the protection of devices and personal and health data [13]. Altogether, the abovementioned skills play a constitutive role in everyone's digital experience [14].

Gen Z resumes all the digital skills till here described even if continuously changing and adapting to the day by day evolving technologies. This changing endeavor has led researchers to develop different points of view about Gen Z digital skills [15, 16]. According to Lorenzo and Dziuban [17], Gen Z have good technical skills but they are unable to effectively search for information on the web. They are quick

at finding answers via Google and YouTube, but they lack the critical thinking skills to evaluate sources [2]. Indeed, Gen Z shows good skills in using smartphones which ensures them access to a lot of daily information. This also makes them great multitaskers and permits them to have an “information age mindset” [18]. Due to their need for immediate acknowledgment, Gen Zers also focus on the development of efficient tech-based communication skills [19]. Quite the reverse, the activity on social media negatively influences their writing skills [20]. In fact, in these environments they use abbreviated language that affects their listening, interpersonal and socialization skills [21, 22].

They crave hyper-personal experiences on social media, and also demonstrate their genuine affiliation to activities that focus on the promotion of social responsibility skills [23]. Most of Gen Z is aware of the importance of honing these skills, especially within a workplace environment [23]. In fact, when considering the development of their professional life, Gen Zers tend to value more the importance of “soft skills” such as working in teams, leadership and empathy to the detriment of “hard skills” like technical or computer skills [24]. This may seem surprising as another study [20] indicates members of this generation as not to have soft skills at the beginning of their professional life.

De Haan [25] depicted geographical location, gender, user experience and time spent on Internet as the variables that mostly impact on digital skills. Conversely, in Gui’s research [26] age resulted the most impactful variable.

Evidence about gender is mixed. While few studies have found that gender is not related to technical skills [27], others [28, 29] revealed a more complex scenario in which men and women do not differ greatly in their skills, but females have lower perceived competences which may affect their behaviors. According to Liff and Shepherd [30] and to Eglesz et al. [31] gender difference may be justified with the greater time spent by men playing video games and with a greater tendency to imitate their friends. Digital skills’ mastery can also depend on the education degree type [32] and on the technologies adopted in terms of quantity of digital tools and content used [33].

As showed, research on Gen Z’ digital skills is part of a wider debate about defining and understanding the new literacies required to fully participate in the digital age. The previous considerations reveal also how paramount is for organizations - i.e. Universities or Companies - to discover and foster the main Gen Z digital skills in order to make the most of innovation and organizational growth.

As showed, the area is complex to navigate due to the numerosity of competing factors that affect digital skills [34].

Yet, so far this topic has not been examined sufficiently to understand whether Gen Zers are really proficient or not in terms of digital skills and what are the most and least developed ones.

### **3. Method**

We collected data from 1,000 Italian secondary school students (49% females). The survey was not-mandatory and was carried out in 2019.

All of them belong to Gen Z, born between 2000 and 2004. 74.7% of students were enrolled in High Schools while 25.3% were enrolled in a Professional school. The most representative High School curricula are those related to sports while those with the lowest number of students are humanities and languages curricula. The most representative course for Professionals is the one on Computer Science while the one with the lowest number of students is the course of Construction, Environment and Territory (see Table 1).

**Table 1.** Percentage of students enrolled in each school curriculum

	<i>Curriculum</i>	<i>Percentage of students</i>
High School	Sports	30.4%
	Humanities	6.9%
	Science	19.1%
	Arts	10.8%
	Languages	7.5%
Professional School	Computer Science	17.1%
	Construction, Environment and Territory	2.8%
	Tourism	5.4%

We asked participants to complete an online questionnaire. We used the Internet Skills Scale (ISS) [35] and the Digital Natives Assessment Scale (DNAS) [36] that have been recognized by literature [37, 38] as two of the most valid and reliable surveys to investigate 21st-century digital skills. The scale items are reported below.

*Internet Skills.* The five dimensions of internet skills were measured using the Van Deursen et al. [35] ISS with a five-point agreement Likert scale and with sample items “I know how to open downloaded files” for Operational Skills, “I know how to install apps on a mobile device” for Mobile Skills, “I find it hard to decide what the best keywords are to use for online searches” for Information Navigation skills, “I know which information I should and shouldn’t share online” for Social Skills.

*Digital Nativity.* Students' digital nativity was measured with the four dimensions related to this topic were measured using the Teo [36] DNAS with a five-point agreement Likert scale and with sample items “I use the internet every day” for Growing with technology, “I am able to use more than one application on the computer at the same time” for “Be multitasking in a comfortable way”, “I use a lot of graphics and icons when I send messages” for “Use of graphics and images for communication” and “When I send out an email, I expect a quick reply” for “Desire of instant gratification”.

### 3.1 Statistical analysis

In the descriptive analysis of digital skills, the 35 items of ISS [35] have been grouped into the following 5 macro areas according to the reference scale: Operational,

Informational, Social, Creative and Mobile. For each area, the average as well as the standard deviation of the related items' answers has been considered. Then, the average has been obtained for each macro area of competence (see Table 1).

Likewise, in the analysis of 21 items of DNAS [36], the reference subscales were: Growing with technology, Being multitasking in a comfortable way, Using of graphics and images for communication, Desiring of instant gratification. For each subscale, we computed the average as well as the standard deviation of the related items' answers (see Table 2).

Afterwards, multivariate regressions have been performed for each of the considered macro areas (dependent variable) on the following independent variables:

- Gender (male = 0, female = 1)
- Year of birth
- Type of School (Professional school = 0, High Schools = 1).

#### 4. Results

ISS descriptives reveal that respondents are very competent for what concerns the mobile, social and operational point of view. Mobile devices seem to play a very important role in their lives. This is consistent with the increasing demand of this generation for more advanced mobile device features, such as advanced internet browsing, taking photos, and playing games [39]. Moreover, mobile devices are proven to have a leading position in their information acquisition, contacts management and social networking [40]. From the operational point of view, students confirm to have good proficiency in these skills, so they benefit the Internet in all of its aspects.

Informational and Creativity's areas are the two with the lowest average, indicating that students are not so confident in selecting online information and feel little skilled in publishing resources they create online. Moreover, they have few skills related to website design (see Table 2).

According to a detailed analysis, the items related to content's licenses usage and website design are the ones with the lowest average score (2.17 and 2.55 of average, respectively). The latter could be explained considering that today a website is implemented using the so-called Content Management System software which lets a user build his/her own website with few efforts in the design phase. The lack of knowledge about how to manage licenses can be explained considering the use of social networks where content sharing takes place instantly without recognizing who is the original author.

**Table 2.** ISS Descriptives

<b>ISS</b>	<b><i>N.</i></b>	<b><i>Average</i></b>	<b><i>S.D.</i></b>
Operational	1000	4.32	0.59
Informational	1000	2.15	0.64
Social	1000	4.43	0,55
Creativity	1000	3.23	0.72
Mobile	1000	4.51	0.59

DNAS' descriptives reveal that students exhibit a quite high score average in all of the four subscales. The subscale in which students feel more competent is the one related to "Being multitasking". In this case, students agree to describe themselves as multitaskers for all the 6 items of this area of competence. Indeed, the "Desiring of instant gratification" high score average expresses respondents need to receive timely feedback and immediate rewards (see Table 3).

**Table 3.** DNAS Descriptives

<b>DNAS</b>	<b>N.</b>	<b>Average</b>	<b>S.D.</b>
Growing with technology	1000	4.7	1.13
Being multitasking	1000	5.41	1.14
Using of graphics and images	1000	4.00	1.23
Desiring of instant gratification	1000	5.07	.95

We used, as mentioned above, the multivariate linear regression model to test the influence of the independent variables on the Internet skills. We found the strongest effect to be Year of birth on Operational skills, and a weaker but significant effect on Creativity and Mobile skills. Gender instead results as a significant predictor of Informational, Social and Creativity skills. Compared to males, females have on average a significantly lower score for Informational and Creativity and a higher score on Social skills. Course type is instead a significant predictor of Operational, Social and Creativity skills. Compared to professional school, high school show on average a lower score for Operational, Creativity and Social skills. Results of the multivariate regressions for ISS are shown in Table 4.

**Table 4.** Multivariate regressions for ISS

	<b>Operational</b>	<b>Informational</b>	<b>Social</b>	<b>Creativity</b>	<b>Mobile</b>
Years of birth	-.084*** (0.12)	.006 (0.13)	-.016 (0.11)	-.025** .015	-0.022* 0.12
Gender	-.056 (0.37)	-.149*** (0.41)	.128*** (0.36)	-.253*** (.046)	-.003 (0.39)
Type of school	-.141*** -.041	0.65 0.45	-0.78** 0.40	-.120** (.051)	-0.66 (-0.42)
N	1000	1000	1000	1000	1000

Notes: Standard errors in parentheses. Gender: male = 0, female = 1. Type of school: professional = 0, High Schools = 1.

“\*p<0.10 \*\*p<0.05 \*\*\* p<0.01”

DNAS regressions show that the Year of birth has an effect on Grew Technology only. Compared to males, females have on average a significantly lower score for Being Multitasking. High schools have on average a significantly lower score on all subscales with the exception of Using graphics and images. Results of the multivariate regressions for DNAS are illustrated in Table 5.

**Table 5.** Multivariate regressions for DNAS

	<i>Growing with technology</i>	<i>Being Multitasking</i>	<i>Using of graphics and images</i>	<i>Desiring of instant gratification</i>
Year of birth	-0.42* (.023)	-.024 (.023)	.035 (0.25)	.005 (0.20)
Gender	-.005 (.073)	-.133* (.074)	.026 (.080)	-.028 (0.62)
Type of course of study	-.176** (.081)	-.140* (0.81)	-.059 (.088)	-.124* (.068)
N	1000	1000	1000	1000.

Notes: Standard errors in parentheses. Gender: male = 0, female = 1. Type of school: professional = 0, High Schools= 1.

“\*p<0.10 \*\*p<0.05 \*\*\* p<0.01”

## 5. Discussion and Conclusions

In this paper, we examined Gen Zers’ digital skills. As emerged in the results section, we found they are highly proficient in the Mobile, Social and Operational related skills. This is consistent with the existing literature that considers this generation as techno-connected and exposed to an unprecedented amount of technology in their upbringing [2, 39]. Concurrently, results reveal excellent multitasking skills due to the capacity to use multiple media and manage different tasks simultaneously and better than previous generations [18]. Informational and creativity related skills are the least developed probably due to the greater effort needed to select information and create new knowledge [41]. In fact, informational skills mainly refer to the ability to find information, obtain it, and evaluate its relevance in a digital environment. Conversely, creativity skills focus on the ability to create content [42]. This last result can be considered as never outlined in literature as far as the authors know.

From a research point of view, we provide an empirical test of Gen Zers’ skills, based on ISS and DNAS. We also highlight differences in digital skills in relation to Gender, Year of birth and Type of course in which students were enrolled. The need to foster creativity and creative skills is emerging. Females seem to be even less creative than males but more socially skilled confirming the assumptions that creativity is more

strongly associated with stereotypically masculine characteristics [43] and that women are more able at building social relations [44].

From a practical point of view, our results are useful both to universities and to companies because they inform them of the main Gen Z digital skills. In fact, Universities and HR professionals need to look at Gen Z if they want to be able to compete in tomorrow's world. Attracting, engaging and retaining Gen Z is the topmost priority for today's corporate world [45]. Generation Z must be understood, and organizations must try their best to meet their career expectations. In such a perspective, HR professionals play a critical role in understanding and respecting the different skills this generation brings to professional life.

University instructors should deliver learning paths fitting Gen Z's specific digital skills in order to improve the effectiveness of their teachings. Nevertheless, universities should make the effort to foster digital skills useful in working life but not as consolidated as this work indicates.

Lastly, it should be important to let Gen Zers understand the job market rules, how to work in a multicultural context, and how important it is to be a team player.

From here on, we detail the implications for Universities and HR professionals explaining how they can approach Gen Z development

## **5.1 Implications for Universities**

Based on our results, we can infer that university's instructors should support Gen Zers in the learning path without rigidity, encouraging them to evaluate and reflect on their decisions. It is therefore necessary to design educational courses to train subjects permitting the development of creativity and construction and deconstruction of knowledge. This could happen, for example, using the "flipped classroom", where some of the normal lecture content is pre-recorded and watched by students outside of class. In fact, through technology enabled flipped classroom strategies, students develop higher order thinking skills and creativity [46].

Since these students are operationally savvy and multitasking, they will expect to rely on internet resources to help them learn. Use of different forms of technology (i.e. web searches, web games, virtual environment and appropriate use of social media) will be a basic course expectation for these students.

Universities should think innovatively outside existing programs boundaries. As Gen Z students have a remarkable reliance on ubiquitous technology, it should be quite prevalent in the learning context. Multiple sources of learning resources and multimedia contents such as text, video, audio, conversation, discussions, sharing notes and knowledge, taking picture of lecture, recording presentation, sharing video lecture, should be accessed using one or more devices [47]. Ability to move back and forth (sometimes rapidly) between real and virtual spaces could be anticipated by teachers. For instance, even during a lecture a student may be asked to spend some time both in physical learning environment and switch to virtual learning

Indeed, delivering target-specific courses could help them to understand what is behind the technology they use so frequently.

Lastly, learning more about how to manage licenses through specific courses could be useful to strengthen the awareness on this topic.



## 5.2 Implications for HR professionals

We can also infer that HR professionals could expect future workers to perform multiple tasks simultaneously and work smartly by switching from computer to mobile. For this reason, developing an effective mobile work environment can be considered one of the major challenges that many organizations need to face. Developing policies about mobile work can be viewed as a key to success in both managing and supporting Gen Z workers.

However, HR should take an effort to support the development of training sessions in the form of apprenticeship programs to sharpen Gen Z's creativity. Such programs could focus on encouraging freedom of expression also enhancing entrepreneurial spirit [48]. Additionally, organizations, boss, and colleagues' support should be considered the most creativity stimulant factors. For their part, HR selectors should acquire more awareness in choosing and using tools for a more accurate detection of creativity.

Work environment should be structured to allow flexibility and change, as well as to enable Gen Z's participation in decision making. Likewise, it would be useful to offer incoming workers precise rules about the dissemination of information related to the copyright company policies since they are not skilled on these issues. Some best practices for onboarding Gen Z workers could include the following.

- Providing a checklist with the description of specific goals, responsibilities, and resources for the first day, week, month. These could include any information, copyright materials, and experiences to help new workers to know what they need to succeed in their new roles.
- Use technology such as videos and any other communication media (i.e. social networking tools) to share information related to the company and to facilitate internal interactions.

Finally, it would be necessary to improve their overall digital skills delivering, for example, courses to enhance web-related skills somehow useful to the specific context they are called to work in.

## 5.3 Limitations and directions for future research

This work has some limitations that offer inspiration for future research: the dataset is limited to Italian people in terms of nationality and to students who are enrolled in Professional courses or High schools. Future research could carry comparative studies on different nationalities and different courses of studies. It would also be valuable to see how Gen Zers at high school are compared to students at their first years of University, to test whether current university educational models already play a role in developing digital skills. Likewise, variables besides digital skills would be investigated.

Finally, this research belongs to generational research which is often criticized for confounding generational, age and tenure effects. Therefore, we recommend longitudinal studies on Gen Zers over the years.

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