A Decade of Digital Literacy: Comparing Business Economics Students' Competencies from Generation Y to Z

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Abstract

Digital literacy is a necessity in today's global environment, represented by a digital and data-driven economy. In such settings, being able to use digital technology effectively and efficiently is nowadays a key part of educational and career success. As each new generation of students enrolls at the university with varied technical backgrounds, it is important that curriculum design account for how digital skills evolve. The goal of this research is to examine the differences between Generation Y students surveyed in 2014 and Generation Z students surveyed in 2024 regarding their digital literacy and attitudes towards learning information technology. A longitudinal, cross-sectional study used the same questionnaire based on a three-dimensional digital-literacy framework to collect data from first-year business economics students in both years. The results demonstrate that, although self-ratings remain essentially unchanged, Generation Z is more confident in utilising mobile devices for learning, fixing technical problems on their own, and collaborating online. These findings imply that students' skill levels have improved after exposure to a broader digital environment, underscoring the need for tailored teaching methods that do not assume Generation Z is equally digitally fluent.

Keywords: digital literacy, business economics students, higher education, Generation Y, Generation Z

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Introduction

In today's world dominated by global digital economy, digital literacy is crucial, as it enables individuals to effectively utilise technology in their daily lives to study, work, and communicate. Technology develops rapidly, leading many companies towards digital transformation, which means people need to be digitally literate to participate in the digital world. Although digital transformation was part of the strategic direction of many businesses, the Covid-19 pandemic accelerated it, not just in companies but also across the global economy. In that sense, digital literacy is nowadays one of the key skills in the digital economy. Additionally, digital literacy is increasingly recognised as a key skill in higher education, as it is necessary for both academic achievement and employment in a digitalised job market (Ilomäki et al., 2014). Frameworks such as the European Commission's DigComp have highlighted the need for individuals to develop digital competencies beyond operational knowledge, including critical thinking, online collaboration, and information evaluation (Vuorikari et al., 2022).

Given the speed of technological change and the digital transformation of society, it is interesting to observe how different generations use digital technologies. Generations differ not only in their years of birth, but also in the context in which they grew up and learned to use digital tools. In that sense, the term "digital natives" refers to people who were born and grew up in a world where digital technology was already prevalent. Although both Generation Y and Generation Z are considered digital natives, research suggests they differ in their patterns of technology use, attitudes toward digital tools, and expectations in educational and workplace contexts (Twenge, 2023).

While digital literacy has been widely studied (e.g., Shopova, 2014; Komlayut & Srivatanakul, 2017), longitudinal comparisons using consistent frameworks across time and generations remain scarce. This study addresses this gap by comparing the digital literacy competencies of business economics students in 2014 and 2024 using the same framework developed by Ng (2012). The goal is to examine how digital literacy has evolved over a decade, explore differences between Generation Y and Generation Z students, and reflect on the implications for updating digital literacy models. To fulfil the stated goal, empirical research has been conducted over 10 years on a sample of business economics students. The same questionnaire was distributed in 2014 and in 2024 to the sample of first-year business economics majors.

The structure of this paper is as follows. After this introduction, the second part of the paper provides a brief theoretical background, followed by an explanation of the methodology. The fourth part of the paper presents the results of the empirical research and the related discussion, followed by the conclusion in the fifth part.

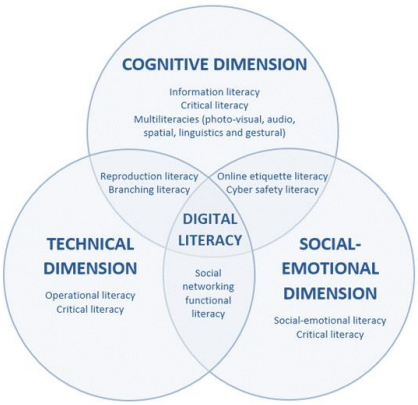
Theoretical Background

In the last decade, according to Ilomäki et al. (2014), when discussing technology-related competencies, the word "digital" is used rather than terminology like "information and communication technology" or "information technology", which were used in the past. This change in vocabulary shows how technology has evolved and how the idea of digital literacy has expanded to encompass a broader range of skills and abilities now necessary in society. The European Union has also confirmed the importance of digital literacy through the DigComp framework, which aims to help people improve their digital skills in areas such as safety, online collaboration, information literacy, and creating digital content (Vuorikari et al., 2022). However, it is important to understand the difference between digital literacy and digital skills. In that sense, Richardson and Bissell (2019) explain that digital skills refer to the usage of

information technology (IT) related skills for solving problems, while Siregar (2024, pp. 12) defines digital literacy as "a person's ability to use digital media in an appropriate, wise and responsible way to find, utilize, process, package, evaluate and disseminate information". This definition explains that digital literacy is not just the ability to use digital devices but also encompasses a range of competencies necessary for evaluating digital content, communicating effectively, and resolving problems in today's digital environments. This is also supported by Eshet (2004), who argues that digital literacy encompasses a wide range of complex cognitive, motor, sociological, and emotional abilities that are essential for users to function effectively in digital environments, in addition to the ability to use a digital device or software.

Researchers have also sought to define digital literacy in terms of educational systems, where students need to use digital tools, understand and evaluate digital information, and interact with others online. In that sense, Press et al. (2019) argue that digital literacy in higher education is a rich area for study, while a recent study by Kayyali (2024) emphasizes the need to embed digital literacy systematically within higher education curricula, highlighting challenges such as limited faculty training and variability in student competencies. Belshaw (2012) emphasizes that digital literacy is inherently context-dependent and should be seen as a continuum rather than a fixed set of skills. Similarly, Littlejohn et al. (2012) argue that digital literacy involves not only personal skills but also learners' ability to adapt critically to new digital contexts in academic and professional environments. One of the digital literacy frameworks, which is designed for learning and higher education, was presented by Ng (2012) and comprises three dimensions of digital literacy: (i) technical dimension, (ii) cognitive dimension, and (iii) social-emotional dimension, as presented in Figure 1.

Figure 1
Digital literacy framework



Source: Author's work based on Ng (2012)

Generational differences have a significant impact on how students use technology, as well as their expectations, motivation, and approaches to learning (Tyacke & Howell, 2018). To better understand these differences, one should first explain the generational cohorts most commonly referenced in educational research. They are usually based on the year of birth and everyday formative experiences, which influence beliefs, behaviours, and attitudes towards technology. Table 1 presents the classification of six currently living generations, along with their ages at the time the data collection for the study presented in this paper was conducted.

Table 1
Classification of generations

Generation	Year of birth	Age in 2014	Age in 2024
Silent Generation	1928 – 1945	69 – 86	79 – 96
Boomers	1946 – 1964	50 – 68	60 – 78
Generation X	1965 – 1980	34 – 49	44 – 59
Generation Y	1981 – 1996	18 – 33	28 – 43
Generation Z	1997 – 2012	2 – 17	12 – 27
Generation Alpha	2013 – today	0 – 1	0 – 11

Source: Author's work based on Dimock (2019) and Annie E. Casey Foundation (2025)

This study examines Generation Y, often known as Millennials, born between 1981 and 1996, and Generation Z, born between 1997 and 2012 (Dimock, 2019). In order to define students raised in a technology-saturated environment, Prensky (2001) coined the term "digital natives", which can be assigned to both Generation Y and Generation Z. While both generations share early exposure to digital tools, their formative contexts differ. Hence, assumptions about uniform digital competence across the two "native" generations need to be closely examined. Generation Y refers to the group of people who grew up with the internet and are usually good at using new technology. However, they generally prefer structure and instruction from teachers (Turner, 2015). Generation Z students, on the other hand, are usually autonomous, practical, and very familiar with technology. They generally choose learning settings that are self-paced, interactive, and visually interesting, which is probably because they are always using digital media (Mohr & Mohr, 2017). Changes across generations highlight the importance of rethinking teaching methods and the skills needed, particularly in digital literacy.

Methodology

As stated in the introduction, this paper presents the results of two empirical studies conducted over a ten-year gap, one conducted in 2014 and the other conducted in 2024. This section presents the employed methodology.

Research instrument

In this research, the approach established by Ng (2012) was used to assess the levels of digital literacy among the observed population. Alongside the framework used to evaluate attitudes towards studying IT and assess the level of digital literacy, the same research (Ng, 2012) also motivated some additional questions related to the usage of IT among students (e.g., digital natives related questions). The framework outlined by Ng (2012) comprises seven questions that assess respondents' attitudes towards IT learning on a 5-point Likert scale, where grade 1 indicates total disagreement and grade 5 indicates total agreement. The same 5-point Likert scale was used for statements comprising the digital literacy framework. As described earlier, Ng (2012) proposes three dimensions of digital literacy: the technical dimension (6 statements), the cognitive dimension (2 statements), and the social-emotional dimension (2 statements). Besides that, respondents were also asked to self-assess their current level of digital skills on a 5-point Likert scale ranging from 1 (very low) to 5 (excellent). The research instrument is shown in Table 2.

Table 2
Research instrument

Variable group	ID	Statement/Question	Answers
Current digital skills	TIV	How do you assess your current digital skills?	5-point Likert scale
Digital natives	DD1	Are you familiar with the term "digital natives"?	Yes, I heard of it, but I am not sure what the term means. No.
	DD2	Digital natives are students born into a developed digital environment who use digital technology from an early age and find navigating the digital world completely natural. With this definition in mind, do you consider yourself a digital native?	Yes; No
Attitudes towards IT learning	ATT1	I like to use IT in the learning process.	5-point Likert scale
	ATT2	I learn better with the help of IT.	5-point Likert scale
	ATT3	IT makes learning more fun.	5-point Likert scale
	ATT4	I have more motivation to learn with IT.	5-point Likert scale
	ATT5	IT allows me to learn independently and on my own initiative.	5-point Likert scale
	ATT6	The use of mobile technologies for educational purposes has a lot of potential.	5-point Likert scale
	ATT7	Teachers should make more use of IT in the educational process.	5-point Likert scale
Technical dimension of digital literacy	TD1	I know how to solve my technical problems on my own.	5-point Likert scale
	TD2	I easily learn to use new technologies.	5-point Likert scale
	TD3	I follow the development of new technologies.	5-point Likert scale
	TD4	I know a wide range of technologies.	5-point Likert scale
	TD5	I possess technical skills in using IT to present my knowledge.	5-point Likert scale
	TD6	I have good IT skills.	5-point Likert scale
Cognitive dimension of digital literacy	CD1	I am confident in my Internet search skills for finding quality information.	5-point Likert scale
	CD2	I am familiar with problems related to Internet use (e.g., security issues, plagiarism, and piracy).	5-point Likert scale
Social-emotional dimension of digital literacy	SED1	IT enables me to collaborate more effectively with colleagues on various projects and other educational activities.	5-point Likert scale
	SED2	I often ask my colleagues for help with teaching assignments online.	5-point Likert scale

Source: Author's work following Ng (2012)

Data collection

Data collection was conducted in September and October of 2014 and in September and October of 2024. Both times, online questionnaires have been distributed to all students of the first year who take business economics as their major within the first two weeks of their classes at the Faculty of Economics & Business, University of Zagreb, Croatia. The participation in the research was entirely voluntary and anonymous.

Sample

Two samples were used in this research: one in 2014 and one in 2024. In 2014, 276 students took part in the research, while in 2024, 182 students participated. Since the goal of this study is to examine differences between Generation Y and Generation Z, all students who were not in the age group of the observed generation (Generation Y in 2014 or Generation Z in 2024, according to Table 1) have been excluded from further analysis. After excluding older students, 270 students from Generation Y participated in the research in 2014, and 178 students from Generation Z participated in the research in 2024, forming the final samples for further analysis. The sample structure regarding sex and student status is shown in Table 3.

Table 3
Sample structure

		2014 (*n* = 270)	2024 (*n* = 178)
Sex	Female	65,93%	61,24%
	Male	34,07%	38,76%
Student status	Full time	90,37%	78,09%
	Part time	9,63%	21,91%

Source: Author's work

Results & Discussion

Table 4 presents the results of the self-assessment of current digital skills for Generation Y students (2014 respondents) and Generation Z students (2024 respondents). It is evident that in both generations, most students consider their digital skills to be good (44.44% in 2014 and 38.76% in 2024). However, Generation Z reported fewer "Good" and "Excellent" ratings and noticeably more "Weak" ratings than Generation Y. These results do not imply that Generation Z students know less, but can be an indication of better self-judgement of surveyed students. Moreover, they could also suggest that the label "digital native" does not automatically imply that someone is very good with technology, which reflects the caution raised by Kirschner & De Bruyckere (2017).

Table 4
Self-assessment of the current level of digital skills

TIV answers	2014 (n=270)	2024 (n=178)
Very weak	1,11%	1,69%
Weak	14,07%	21,35%
Good	44,44%	38,76%
Very good	32,96%	34,27%
Excellent	7,41%	3,93%

Source: Author's work

Table 4 presents respondents' familiarity with the term "digital natives" (DD1) and the extent to which they self-identify as such after the term is explained to them (DD2). In both generations, the majority of respondents were not familiar with the term "digital native" (73.70% of the surveyed Generation Y students and 51.69% of the surveyed Generation Z students). However, the results reflect a clear shift towards greater familiarity with the term among Generation Z students. After the term was explained, 59.63 % of Generation Y students in 2014 answered "Yes," compared with 64.61 % of Generation Z students in 2024. These results suggest that the concept of digital natives has become more visible over the past decade and that Generation Z students are slightly more likely to adopt the label than the Generation Y. One possible explanation

is that the term became more common in academic writing, teacher training, and popular media, so today's students are more likely to come across it and know its meaning (Bennet et al., 2008). At the same time, the fact that roughly one third of the Generation Z respondents in 2024 still do not identify as digital natives aligns with studies showing that exposure to digital technology does not automatically translate into confidence or a sense of being a native. This is in line with the conclusion made by Reid et al. (2023, pp. 584) who argue that "exposure to digital technologies does not necessarily equate with digital literacy". These results are also consistent with the earlier finding that Generation Z students rate their own digital skills more cautiously than Generation Y students (see Table 5), indicating that familiarity with the label does not necessarily equate to higher self-assessed proficiency.

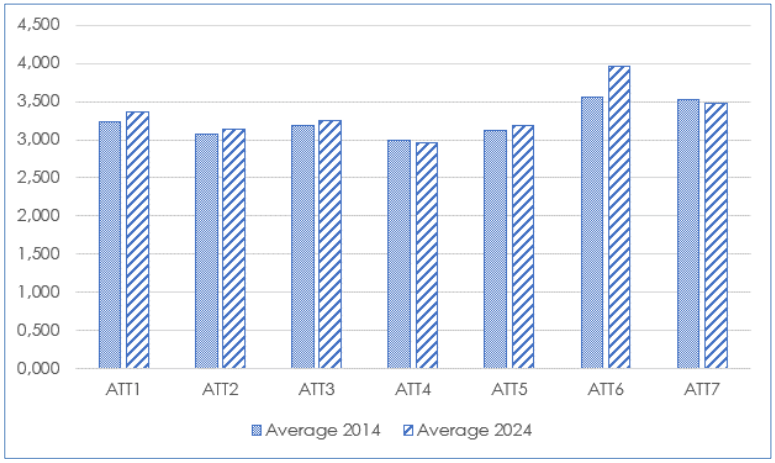
Table 5
Familiarity with the term digital natives and identification of respondents as digital natives

Variable	Answers	2014 (*n* = 270)	2024 (*n* = 178)
DD1	Yes	10,74%	20,22%
	I heard of it, but I'm not sure what the term means	15,56%	28,09%
	No	73,70%	51,69%
DD2	Yes	59,63%	64,61%
	No	40,37%	35,39%

Source: Author's work

Next, Figure 2 graphically presents the results of the attitudes towards learning IT group of variables. The mean values are higher for all observed variables in 2024 than in 2014, except for the ATT4 and ATT7 variables, which measure motivation to learn IT and the belief that teachers should make more use of IT in the educational process, respectively. Generation Y (2014 respondents) tends to show higher intrinsic motivation to teach IT as they often perceive it as a novel and valuable skill, while Generation Z (2024 respondents), having grown up fully immersed in digital environments, may take digital skills for granted, which can slightly lower explicit motivation levels. The slight decline in ATT7 suggests a more critical or nuanced perspective among Generation Z respondents toward teachers' role in integrating IT, possibly reflecting increased expectations for the effective and innovative use of digital tools in education rather than mere use. However, this decrease in mean values for ATT4 and ATT7 is very low (see Table 6).

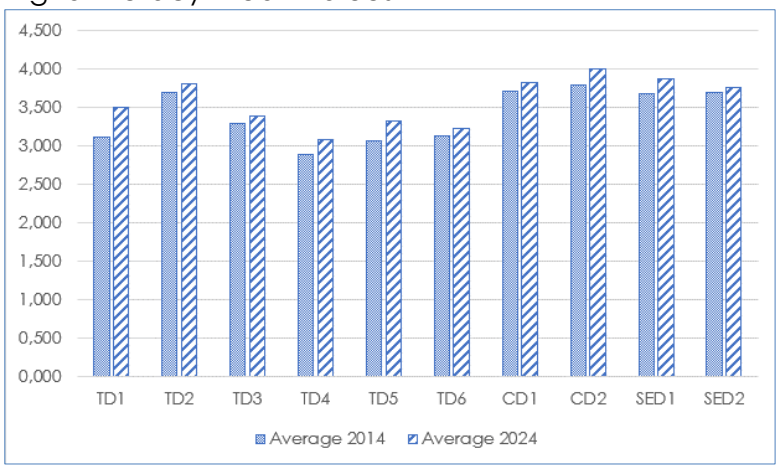
Figure 2
Attitudes towards learning information technology mean values



Source: Author's work

Figure 3 graphically presents the mean values of the variables across three dimensions of digital literacy. It can be observed that the mean values are higher for all observed variables in 2024 than in 2014.

Figure 3
Digital literacy mean values



Source: Author's work

Table 6 presents the mean values of all observed variables, along with the results of the Mann-Whitney U test used to determine whether the differences between the 2014 and 2024 results are statistically significant. The data were first tested for normality and homogeneity of variances using the Shapiro–Wilk and Levene's tests, respectively. Since the data violated the assumption of normality and, for some variables, also the assumption of equal variances, the non-parametric Mann-Whitney U test has been used to compare research results regarding mean values between Generation Y and Generation Z. Results show that there is a statistically significant difference in familiarity with the term "digital natives" between Generation Y and Generation Z (see Table 6) at the 1% level of statistical significance. Besides, compared to the Generation Y students in 2014, Generation Z students in 2024 express a stronger belief in the potential of mobile technologies for educational purposes (ATT6; p-value < 0.001), know how to solve their technical problem more efficiently on their own (TD1; p-value = 0.001), feel more capable of using digital tools to present their knowledge (TD5; p-value = 0.016),

report greater confidence in advanced Internet search and information-quality evaluation (CD1; *p*-value = 0.044), and display a modest yet significant rise in readiness to collaborate with their colleagues using IT (SED1; *p*-value = 0.093).

Table 6
Mean values and the results of the Mann-Whitney U test group comparison

	Year	Mean	SD	SE	CoV	Mean Rank	Sum Rank	Mann-Whitney U	p-value
TIV	2014	3.315	0.845	0.051	0.255	231.407	62480.000	25895.000	0.139
	2024	3.174	0.869	0.065	0.274	214.022	38096.000		
DD1	2014	2.630	0.671	0.041	0.255	244.211	65937.000	29352.000	< .001***
	2024	2.315	0.790	0.059	0.341	194.601	34639.000		
DD2	2014	1.404	0.492	0.030	0.350	228.930	61811.000	25226.000	0.290
	2024	1.354	0.480	0.036	0.354	217.781	38765.000		
ATT1	2014	3.241	1.287	0.078	0.397	220.244	59466.000	22881.000	0.378
	2024	3.371	1.134	0.085	0.336	230.955	41110.000		
ATT2	2014	3.070	1.249	0.076	0.407	221.993	59938.000	23353.000	0.604
	2024	3.135	1.157	0.087	0.369	228.303	40638.000		
ATT3	2014	3.181	1.253	0.076	0.394	223.024	60216.500	23631.500	0.760
	2024	3.247	1.153	0.086	0.355	226.739	40359.500		
ATT4	2014	2.996	1.224	0.074	0.408	227.061	61306.500	24721.500	0.595
	2024	2.961	1.166	0.087	0.394	220.615	39269.500		
ATT5	2014	3.126	1.185	0.072	0.379	223.450	60331.500	23746.500	0.827
	2024	3.180	1.141	0.085	0.359	226.093	40244.500		
ATT6	2014	3.556	1.214	0.074	0.342	207.993	56158.000	19573.000	< .001***
	2024	3.966	1.025	0.077	0.258	249.539	44418.000		
ATT7	2014	3.533	1.187	0.072	0.336	227.813	61509.500	24924.500	0.491
	2024	3.483	1.146	0.086	0.329	219.475	39066.500		
TD1	2014	3.111	1.145	0.070	0.368	208.763	56366.000	19781.000	0.001***
	2024	3.506	1.116	0.084	0.318	248.371	44210.000		
TD2	2014	3.693	1.090	0.066	0.295	219.128	59164.500	22579.500	0.260
	2024	3.809	1.109	0.083	0.291	232.649	41411.500		
TD3	2014	3.289	1.150	0.070	0.350	219.952	59387.000	22802.000	0.345
	2024	3.399	1.166	0.087	0.343	231.399	41189.000		
TD4	2014	2.889	1.088	0.066	0.377	216.967	58581.000	21996.000	0.117
	2024	3.084	1.139	0.085	0.369	235.927	41995.000		
TD5	2014	3.067	1.064	0.065	0.347	212.933	57492.000	20907.000	0.016**
	2024	3.331	1.093	0.082	0.328	242.045	43084.000		
TD6	2014	3.130	1.010	0.061	0.323	219.665	59309.500	22724.500	0.309
	2024	3.230	1.109	0.083	0.343	231.834	41266.500		
CD1	2014	3.715	1.099	0.067	0.296	220.278	59475.000	22890.000	0.376
	2024	3.826	1.046	0.078	0.273	230.904	41101.000		
CD2	2014	3.793	1.108	0.067	0.292	214.943	58034.500	21449.500	0.044**
	2024	4.000	1.058	0.079	0.264	238.997	42541.500		
SED1	2014	3.689	1.134	0.069	0.307	216.483	58450.500	21865.500	0.093*
	2024	3.882	1.059	0.079	0.273	236.660	42125.500		
SED2	2014	3.696	1.168	0.071	0.316	223.835	60435.500	23850.500	0.890
	2024	3.764	1.058	0.079	0.281	225.508	40140.500		

Note: CoV – Coefficient of variation; *** statistically significant at 1%, ** statistically significant at 5%, * statistically significant at 10%; 2014 n=270; 2024 n=178
Source: Author's work

The results presented by Table 5 are in line with previous studies, which reported Generation Z favouring device-integrated, visually rich, and collaborative learning environments (Mohr & Mohr, 2017; Seemiller & Grace, 2016), while also highlighting

that broad digital competence still requires targeted skill development rather than presumed "native" fluency. This was also supported by Huss (2023), who states that although often referred to as "tech addicts", digital natives generally do not possess the digital competency ascribed to them, and their actual technology use differs significantly across individuals and skill areas. In that sense, Kuleto et al. (2021) argue that universities adjust their courses, programs, procedures, atmosphere, and efforts to accommodate the demands of the new generation of students. The results of this study also show that, although Generation Z students' general view of their digital abilities has not changed much in the last ten years compared to Generation Y, certain aspects of their digital literacy have improved. The significant increase in confidence regarding mobile learning technology and digital collaboration reflects recent research indicating that Generation Z learners actively choose flexible, device-integrated learning environments that provide seamless connection and real-time engagement with peers and instructors, as well as visual format of consuming new information, such as video lesions (Shorey et al., 2021; Kumar, & Mamgain, 2023; Huss, 2023). Also, better search skills and presenting abilities noted in Generation Z compared to Generation Y in this study suggest that Generation Z students might have better cognitive and functional digital skills, which could be due to digital technologies becoming more common in both educational environments and in daily life. The results of this study show and support the proposition that being "digital native" does not mean a student is fully fluent in digital technology, which stresses the importance of educating a new generation of students towards efficient use of digital technologies and improving not just their digital skills, but their overall level of digital literacy as well.

Conclusion

This paper presented the results of an empirical research aiming to assess the levels of digital literacy of the students who are considered Generation Y and those who are considered Generation Z. The empirical evidence presented in this paper shows that Generation Z students do not think their digital skills have improved as a whole compared to Generation Y over the ten-year gap. However, they do show selective but significant improvements in some skill areas and attitudes towards technology. In that sense, the comparative analysis of data collected in 2014 and 2024 revealed that Generation Z students show greater confidence than Generation Y in using mobile devices to study, sharing knowledge online, fixing technical problems on their own, performing quality-oriented internet searches, and collaborating using IT. Noted results are in line with mobile devices and cloud-based technologies becoming more common in daily life and in educational settings during the last ten years.

Although this research extends the body of knowledge, one should also be aware of its limitations. First, self-assessment may not fully capture actual proficiency, so future studies should triangulate survey data with performance-based measures. Second, the sample is drawn from a single institution and a single discipline, limiting generalisability. Third, the rapid emergence of generative artificial intelligence tools occurred after survey design, so future studies should incorporate artificial intelligence-related items into the framework to keep pace with evolving competency demands. Addressing these limitations can help educators design evidence-based interventions that move beyond assumptions of being a digital native and foster comprehensive digital literacy for successive student generations.

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