

Editor -in-chief's Note

Digital Quotient (DQ): A Framework for Information and Digital Literacy in Confronting Cyberspace Opportunities and Threats

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Abstract

The increasing spread of digital technologies has profoundly affected the lives of children and adolescents. Parental employment and reduced time for children have led children to excessive internet use, which bring about consequences such as delayed motor and speech development, exposure to inappropriate content, and cyberbullying. Alongside these threats, the virtual space also provides numerous educational opportunities. In such circumstances, the concept of " Digital Quotient " (DQ), introduced in 2016 by the Digital Quotient Institute, is presented as a set of social, emotional, cognitive, and ethical abilities that enable individuals to face the challenges of digital life and benefit from its opportunities. Unlike IQ, which has a genetic nature, DQ is an acquired ability shaped by personality, culture, upbringing, the characteristics of the cyberspace, and the individual's up-to-dateness. The Digital Quotient Coalition (CDI), in collaboration with organizations such as the World Economic Forum, OECD, and IEEE, has developed a standard framework comprising three levels (digital citizenship, creativity, and competitiveness) and eight main domains in the form of 24 to 32

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competencies. Unlike artificial intelligence, which operates machine-based and independently of humans, Digital Quotient is dependent on humans, age, experience, and ethical principles. DQ opportunities include promoting individual and social well-being in line with the UN sustainable development goals, preparing for future careers, and contributing to organizations' environmental and governance programs (Digital-ESG). In contrast, more than half of the world's children face at least one online threat, and children in developing countries are prone to treble risks; cyberbullying is also linked to an increased risk of suicide. Tools such as the Child Online Safety Index (COSI) and the global DQ assessment are introduced to measure this situation. Finally, the researcher emphasizes the necessity of teaching Digital Quotient from childhood, institutionalizing human values, and the collective responsibility of families, schools, governments, and technology companies in protecting children and harnessing the opportunities of the digital world.

Keywords: Digital Quotient, Digital Literacy, Virtual Space, Opportunities, Threats.

Introduction

Digital technologies are constantly progressing and developing over time. This has affected a large part of our lives and those of our children. The daily routines and employment of parents have resulted in them dedicating little time to their children, thus leading most children to use digital tools and the internet to entertain themselves. Children and adolescents use new digital technologies and social media at a tender age and excessively. Among the factors that can have irreversible negative impacts on the mental and emotional health of children as they grow up are their use of the virtual world, getting acquainted with people online, and the amount of time they spend motionless in front of screens. Excessive and prolonged viewing of television and other digital devices by children causes motor delays and speech delays. On the other hand, the use of digital devices and the virtual environment can also bring about cyber risks and moral abuses.

The cyberspace also offers benefits and opportunities despite all its threats. The virtual world can be a vast arena for education, upbringing, and entertainment, but this space exposes children and adolescents to many dangers such as cyberbullying, addiction to technology, violent, frightening, and immoral content, extremism, fraud, and information theft (Samiei, 2023). Accordingly, Digital Quotient (DQ) refers to a set of social, emotional, and cognitive abilities that enable individuals to confront challenges and adapt to the demands of digital life. Digital Quotient was introduced into the literature of this field in 2016 by the Digital Quotient Institute. Furthermore, competencies related to Digital Quotient, such as digital literacy, digital skills, and digital readiness, have become fundamental needs for individuals' future careers and the well-being of societies.

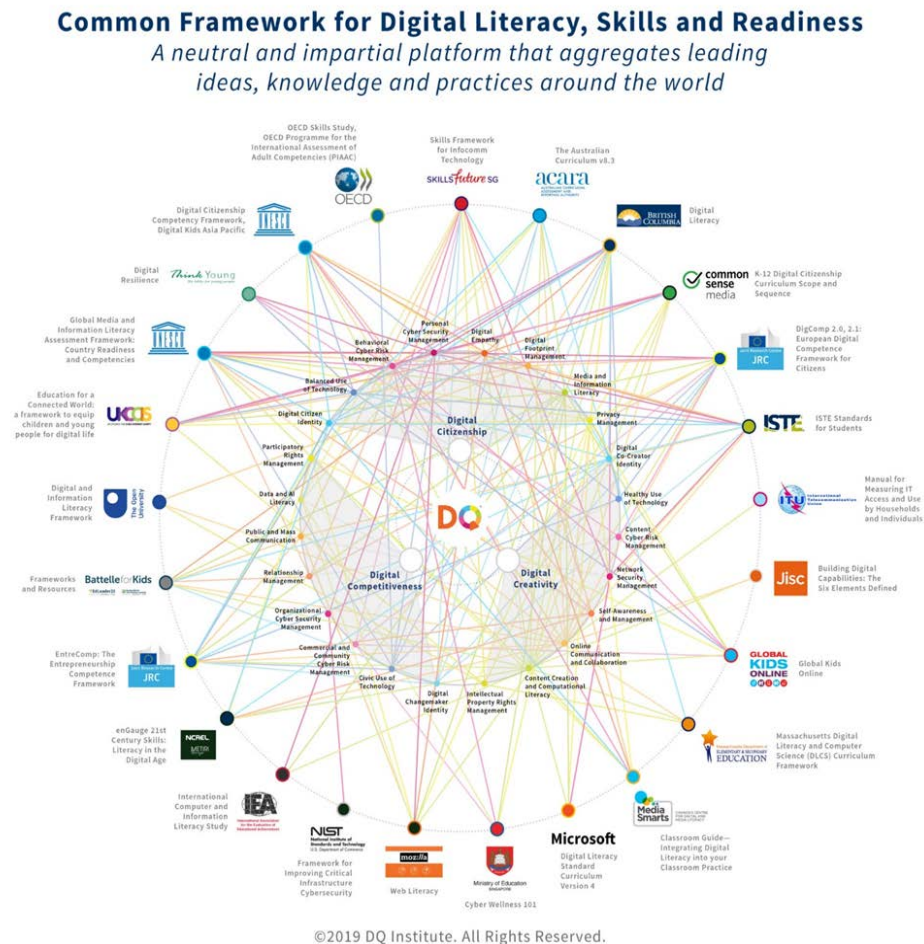


Figure 1. A Common Framework for Digital Literacy, Skills, and Readiness

The World Economic Forum (WEF), the World Bank (WB), and the United Nations (UN) have also referred to this concept as a primary factor in shaping our future world. However, the problem is that most countries worldwide are not fully familiar with Digital Quotient and its implications (Park, 2023). Compared to the growth and advancement of technology, the implementation of necessary training with these digital competencies and the application of required executive policies in this area are progressing slowly. This widening

speed gap will undoubtedly lead to many irreparable and unintended negative consequences for all societies. For example, a 2016 report by the UK Science and Technology Committee indicated that 23% of the adult population in that country lacked basic digital life competencies, which translates to an annual loss of £63 billion from the country's GDP, a situation referred to as the "digital skills crisis" (Digital Health Lab, 2023).

Over the past decade, the number of people online and how often they log in has dramatically increased. From 2013 to 2022, the number of people online surged from 2.7 billion (39% of the ghas fundamentally changed, expanding beyond websites, search engines, and small social networks to vast and dynamic social media platforms, video streaming sites, and interactive environments where people socialize, explore, play, and learn together. In 2023, 51% of teenagers reported experiencing some form of harassment in the past 12 months, compared to 36% in 2022, with 32% reporting severe harassment. 22% cited race or ethnicity and 20% cited gender as reasons why they were harassed online. One-fifth (22%) of teenagers and adults globally have witnessed potentially disturbing content online, including racist and sexist speech (Digital Health Lab, 2023). There is extensive evidence of a widening digital rift between developed and developing nations, Third World societies, women, the elderly, and children, with consequences such as increased economic and social inequalities. To bridge this deepening gap, governments, companies, and organizations today spend millions of dollars annually on digital competency training. However, there is no common and universal understanding of concepts such as digital literacy, digital skills, and digital readiness; these terms are often used interchangeably. Therefore, with the aim of addressing this need and creating a comprehensive framework with integrated rules, the Coalition for Digital Quotient (CDI) was formed using a common global language, along with a set of definitions and a classified structure. This coalition began its work in September 2018 through a joint collaboration between the World Economic Forum (WEF), the Organization for Economic Cooperation and Development (OECD), the IEEE Standards Association, and the Digital Quotient Institute regarding digital competencies (Digital Quotient Institute, 2023).

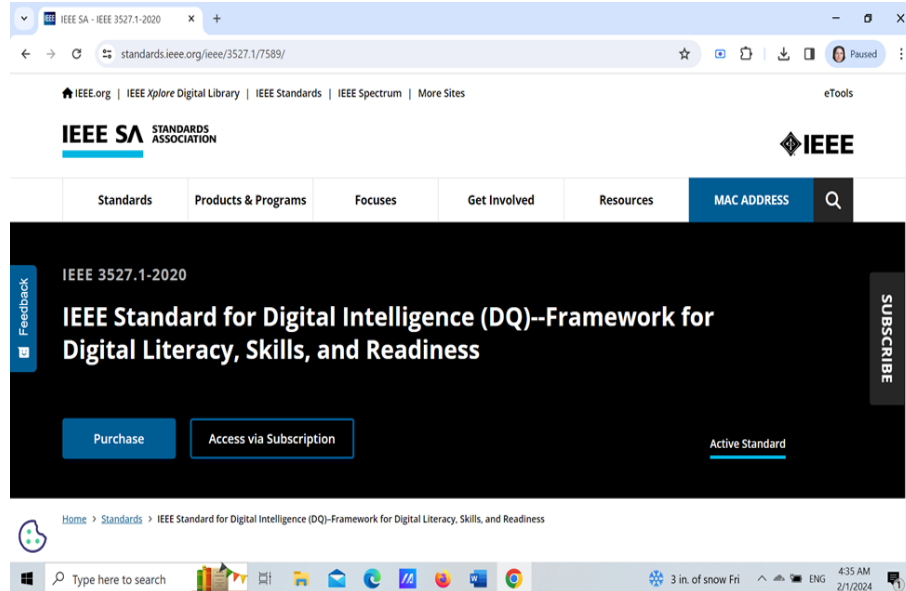


Figure 2. The IEEE Standard for Digital Quotient

What is Digital Quotient and why is it important?

The world of technology is advancing at a very rapid pace, growing and evolving daily, and we are witnessing its progress in various aspects of life through the Internet of Things. This advancement may be admirable in some respects, but the problem arises when we lack information or are even unaware of how it works and its pervasive influence on our lives, and when this technology is readily available to our children and teenagers. In essence, we are unconsciously guiding the younger generation towards cyber exploitation. It is very important to note that the digital space has gradually become an ecosystem for our lives. We must accept that prohibitive solutions to protect ourselves from the potential harms of this space will no longer be effective. Perhaps in the past, avoiding this space was a suitable option for protecting ourselves. But it is clear that the digital space has permeated the fabric of our lives, to the extent that it has even affected industries and businesses. Today, businesses that can operate effectively in the digital space will become leaders in their industries. It is obvious that in such circumstances, the best option to protect children and adolescents from potential dangers is to equip them with knowledge in this field, as well as to provide the necessary training to raise the awareness of digital citizens (Moghaddam, 2018).

Beyond IQ, EQ, and DQ (Digital Quotient), we must prepare ourselves to strengthen the critical skills needed to thrive in the digital age, which we refer to as Digital Quotient (DQ). Fostering Digital Quotient from childhood should be a core program and strategy for government cultural policymakers. DQ is defined as "a comprehensive set of technical, cognitive, metacognitive, and socio-emotional competencies underpinned by universal moral values that enable individuals to face challenges and leverage opportunities in digital life."

Many people believe that Digital Quotient (DQ) is about enhancing the skills needed for more effective use of technology. For example, how to fix a computer that won't turn on or how to use all the features of a smartphone. This is not what we mean by Digital Quotient here. Others think that Digital Quotient (DQ) means the amount of time spent on digital screens and being aware of the increasing dangers of these screens for children who overuse them, or knowing when to disconnect from your device and distance ourselves from anything in this domain that is addictive (Park, 2022).

Digital Quotient , to put it baldly, is a set of social, emotional, and cognitive abilities to adapt to the digital world and face its challenges. As a human capability, this intelligence includes a set of technical, cognitive, metacognitive, social-emotional competencies, and effective interactive methods in a cultural or social environment. Learning this emerging phenomenon is enhanced through interaction with humans and is recognized as one of the main expanding indicators of education and learning in the 21st century in individuals' private and professional lives.

DQ is the abbreviated form of the phrase ' Digital Quotient'. In other words, DQ means digital quotient or digital IQ. In fact, a quotient refers to a number obtained by dividing several other quantities. The number presented as Digital Quotient will indicate our level of maturity in interacting with the digital world and its unique features. It is evident that the larger this number, the greater our ability to interact with this space, and the smaller it is, the lower our ability to effectively communicate with the space in question.

Unlike IQ, which is generally considered an innate intellectual ability determined genetically, Digital Quotient (DQ) must be developed. This type of intelligence is a fundamental element for developing future workforce skills, much like learning a second

language, which is better and faster if done at a younger age (Samiei, 2022, quoting the Digital Quotient Institute, 2023).

Components of Digital Quotient

The Digital Quotient Institute, as the executive body in this field, was established in 2019 and presented the operational framework for Digital Quotient as DQ. Based on Gardner's theory of multiple intelligences, similar to Intelligence Quotient (IQ) and Emotional Intelligence (EQ), Digital Quotient can also be interpreted as a super-intelligence or a collection of several distinct intelligences. This framework consists of three levels and eight interconnected and broad areas, totaling 24 competencies (comprising knowledge, skills, attitudes/values). According to the global standards for DQ presented on the official Digital Quotient website, the 8 components for measuring Digital Quotient within the proposed framework are as follows:

1. Digital Identity

The ability to create a complete online and offline identity in the virtual space is called digital identity. Identity in the virtual world has a different meaning than in the real world. An individual can create one or more anonymous personas in the virtual world, operate with them for a period, leave them unused, or even destroy them after some time without anyone knowing their true identity. Given that identity in the digital world differs in meaning from its application in the real world, this field requires understanding and gaining the necessary knowledge to manage a person's presence in the cyberspace and its short-term and long-term effects.

2. Digital Consumption

Digital consumption is categorized by the amount of time spent using digital media, well-being, and participation in the digital society. Digital consumption is the ability to use digital devices and media, including controlling their use to achieve a suitable balance between virtual and real life.

3. Digital Safety

In the virtual space, there are always many dangerous situations such as cyberbullying, lies and rumors, extremism in various fields, immoral, frightening, violent content, and so on. Digital safety

includes the ability to understand, reduce, and manage various cyber risks through the safe, responsible, and ethical use of technology, ultimately preventing their occurrence and limiting these dangerous incidents.

4. Digital Security

Security has always been one of Man's most important concerns. In the digital world, this concept holds even greater importance. Digital security refers to the ability to identify, prevent, and manage various levels of cyber threats such as hacking, fraud, malware, and so on, and also to protect assets like data, devices, networks, and systems. In this section, protecting passwords, internet security, and mobile security, along with the personal information contained within them, will be addressed.

5. Digital Emotional Intelligence

The ability to express emotions, empathy, and sympathy in digital interactions by forming appropriate relationships with others in virtual spaces is called digital emotional intelligence. Social and emotional awareness, awareness of regulations, and empathy fall into this category.

6. Digital Communication

Communication skills among human beings are very important everywhere in the world, both virtually and in reality. The ability to communicate and collaborate with others using technology is called digital communication. Digital communication means the ability to communicate, collaborate, and empathize with others in order to use digital and media technologies.

7. Digital Literacy

The ability to think logically, the ability to obtain appropriate information, analyze, evaluate, apply critical thinking skills, share, search, and the ability to produce practical and effective content constitute the digital literacy. Digital literacy enables individuals to correctly use digital media, organize digital content, and create content for digital media. Weakness in critical thinking can cause you to fall into the trap of inappropriate and misleading information more

quickly, which undermines your analysis and understanding of the surrounding environment.

8. Digital Rights

Concepts such as privacy, intellectual property, copyright, and freedom of expression are of paramount importance in the digital world. Digital rights, within the framework of Digital Quotient , include the ability to understand and protect concepts such as privacy, intellectual property, copyright, and freedom of expression when using technology. Digital rights mean understanding these concepts and respecting the individual and legal rights of users in the digital world. (Digital Quotient Institute, 2022).



Figure 3. The eight main domains and 24 competencies of the Digital Quotient standard framework

Types of Digital Quotient Levels

Across all eight aforementioned domains, there are three levels of maturity. These levels are:

- Level One – Digital Citizenship: This level demonstrates individuals' ability to use digital technologies in safe and responsible ways, adhering to the ethical principles previously discussed.
- Level Two – Digital Creativity: Digital creativity refers to the ability to become a member of the digital ecosystem and create knowledge, new technologies, and unique content to transform ideas into reality.
- Level Three – Digital Competitiveness: This level addresses the ability to solve global challenges and create new opportunities in the digital economy through the creation of new jobs and entrepreneurship, growth, and its impact on the economy. With these interpretations, there will be 24 digital competencies comprising knowledge, skills, attitudes, and various values (Digital Quotient Institute, 2023).

What is the difference between artificial intelligence and Digital Quotient ?

In very simple terms, the main difference between these two terms can be found in their operational scope. Artificial intelligence operates based on the performance of machines, robots, and generally systems without human intervention, whereas Digital Quotient is largely dependent on humans. The second difference between artificial intelligence and Digital Quotient can be found in the function of each term. The main goal of artificial intelligence is to build a system based on agile algorithms that can operate like the human mind and, by simplifying its mental complexities, to maximize its productivity. In contrast, Digital Quotient, by segmenting itself, aims to showcase human capabilities in acquiring knowledge, solving challenges, and gaining social skills by targeting various domains at levels such as citizenship, creativity, and competition. The third difference between artificial intelligence and Digital Quotient can be seen in the limitations of their frameworks. In Digital Quotient, according to Gardner's theory, by combining eight domains and three levels of this intelligence, twenty-four digital competencies consisting of knowledge, skills, attitudes, and different values can be achieved. Whereas in artificial intelligence, there is no limitation in the framework of activity, and it can be used in all engineering, medical,

economic, and other professions. Finally, it should be said that artificial intelligence is not dependent on human intelligence, and in contrast, Digital Quotient is heavily dependent on human skills.

Artificial intelligence and Digital Quotient are both dependent on humans. Therefore, it is better to develop our creativity by acquiring knowledge, challenging global issues, and moving towards new challenges. After this development, by moving towards smartification, a better future can be created for future generations and the world can be driven towards a smart one consistent with competence, creativity, and intelligence beyond human intelligence.

Digital Quotient is an acquired process

Looking at these components, it is clear that Digital Quotient is an acquired ability. However, despite Digital Quotient being an acquired ability, studies have shown that some personality and genetic traits in individuals affect their level of Digital Quotient.

Inspired by the Five-Factor Model of personality in 1989, which identifies five broad and general components (neuroticism, extraversion, openness to experience, agreeableness, conscientiousness) for human personality, Fred Davis emphasizes that Digital Quotient has a direct relationship with individuals' personality traits. This means that some personalities, due to their characteristics, will have a greater capacity to develop Digital Quotient.

According to studies, among these five personality factors, Digital Quotient has a direct relationship with the degree of openness to experience and agreeableness, and an inverse relationship with the degree of neuroticism. For the other indicators, some traits will have a positive effect and some will have a negative effect. For example, in the extraversion indicator, the more curious an individual is, the higher their Digital Quotient will be. A very interesting point is that regarding the conscientiousness indicator, some users with high Digital Quotient scored low on some traits related to this indicator.

Digital skills are no longer optional but essential. The fundamental digital preparedness of countries begins with basic digital citizenship education and online safety for children. The 2020 Child Online Safety Index assesses levels of digital citizenship, exposure to cyber risks among children aged 8-18, and the protective safeguards they can rely on.

What is Digital Quotient or DQ?

Digital Quotient is a metric for measuring individuals' understanding of Digital Quotient. In the current era, this index is of great importance. If this index is not developed sufficiently and effectively, it will be difficult to utilize the unique capabilities of the digital world. The DQ Index aims to monitor global progress in building digital skills inclusively across the world, with a view to empowering every individual and organization in every country to be digitally prepared - safe, ethical, and competent. The DQ Index significantly helps multi-stakeholder leaders visualize and implement how to ensure the development of individual and organizational digital skill capacities within their sphere of influence through its practical DQ assessment tools.

DQ Assessment and Analysis Tool

The DQ Assessment was developed by the DQ Institute in collaboration with SkillsFuture Singapore to serve as a common measurement and analytical tool for digital skills based on global DQ standards and benchmarks. All data collected from the DQ Assessment is compiled in the global DQ database, which generates the DQ Index, and is used to gauge the impact of specific digital skills initiatives and measure the level of Digital Quotient (DQ) competencies. The Digital Quotient Assessment was created as a web/mobile-based platform that provides assessment and analytical tools to support digital skills training/educational programs for measuring digital skills for individuals and organizations based on global benchmarks.

Conclusion

The DQ Institute was established in October 2016 during a workshop project at the World Economic Forum. The institute's goal was to create a global coalition of stakeholders to teach Digital Quotient to children and to fill gaps in educational systems that lack the resources or expertise to provide these important skills to their citizens. This coalition has been able to reach 600,000 children in over 30 countries with different languages within nine months. The result of the institute's efforts has been an average 10% increase in children's DQ, leading to a 15% reduction in internet-related threats. In today's information society, with the advancement of the Fourth Industrial

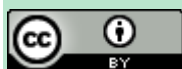
Revolution and the entry into the Fifth Industrial Revolution, and the increasing connection of lives to emerging technologies, we need to be equipped with Digital Quotient skills for the health and prosperity of societies. A set of recommendations and suggestions is provided to policymakers and technology giants in order to support the development of civic online spaces for children and youngsters for information gathering, searching, exploration, and content sharing.

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