DQ®
Digital Intelligence

DQ Global Standards Report 2019
Common Framework for Digital Literacy, Skills and Readiness

Digital Identity
- Digital Citizen Identity
- Digital Co-Creator Identity
- Digital Changemaker Identity

Digital Rights
- Participatory Rights Management
- Intellectual Property Rights Management
- Privacy Management

Digital Literacy
- Data and AI Literacy
- Content Creation and Computational Literacy
- Media and Information Literacy

Digital Communication
- Public and Mass Communication
- Online Communication and Collaboration
- Digital Footprint Management

Digital Emotional Intelligence
- Relationship Management
- Self-Awareness and Management
- Digital Empathy

Digital Security
- Personal Cyber Security Management
- Network Security Management
- Organisational Cyber Security Management

Digital Safety
- Behavioural Cyber-Risk Management
- Content Cyber-Risk Management
- Commercial and Community Cyber-Risk Management

Digital Use
- Balanced Use of Technology
- Healthy Use of Technology
- Civic Use of Technology

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IQ, EQ, and DQ

Dr. Yuhyun Park
Founder of DQ Institute

What is a human being?

We often say that a human has three components, the body, mind, and spirit, which constitute a person's physical structure and strength, ability to think and feel, and essential principle activating and influencing a person, respectively.

History tells us that every industrial revolution that brings new technological advances has also produced structural changes in societal and economic systems. When a society passes through a revolution and individuals in the society try to adapt to a new system, the focus of a human's perceived worth shifts as well. What type of humans can be most successful and prosperous by adapting into and thriving in a new system? Is it individuals who are strong in body, mind, or spirit? New forms of intelligence reflecting the evolving focus of a human's worth, have emerged after each industrial revolution, and have served as a framework for children's education, industry workforce development, and related government policies.

The First and Second Industrial Revolutions of the late 18th and late 19th centuries enabled mechanical means of production at mass scale with increasing levels of efficiency. With industrious machines, a human's physical skills became less important and mental strength - knowledge and skills - became a more valuable trait, thereby changing the focus of a human's worth: shifting from body to mind, especially knowledge. As a result, the concept of intelligence emerged and, in 1912, a German psychologist, William Stern, developed the concept of IQ, or "*Intelligence Quotient*"[4], as a measure of human knowledge and "cognitive skills". Consequently, the current school-based education system has developed, with a focus on developing knowledge workers.

The Third Industrial Revolution of the late 20th century led to the proliferation of computers and the shift

Figure 1: IQ, EQ, DQ
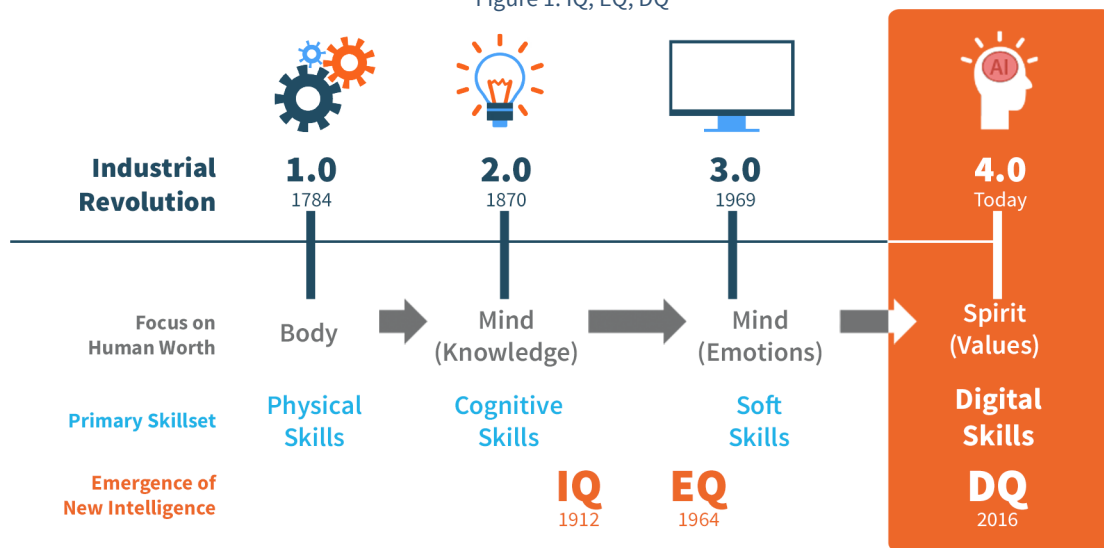
This section is a summarized compilation of work by the Founder of the DQ Institute, Dr. Yuhyun Park[1], including her article published in the Huffington Post in August 2016, her speech at TEDxHanRiver[2] in South Korea in December 2016. The ideas presented in these concept articles were further expanded on by The Rt Hon The Lord Mayor of the City of London Alderman, Peter Estlin, who brought historical insights from the Industrial Revolutions and related human capital development in the United Kingdom as he presented in his speech at the Lord Mayor's Gresham Lecture in 2019[3].

to a service-based economy. The rise of electronic devices and the Internet changed how we interact, work, and play. This evolved society, with its heightened complexity, demanded that individuals have so-called "soft skills" that enable individuals to deal with multi-layered personal interactions, complex conflicts, and sophisticated negotiations, thereby again changing the focus of a human's worth: from knowledge to emotions and relationships. In 1964, Michael Beldoch developed the concept of EQ, or "*Emotional Intelligence Quotient*"[5] that includes empathy, self-awareness, relationship management, and other soft skills. The EQ concept was later popularized and acknowledged by business leaders as a key component of individual skills development that led to business success beyond IQ alone.

Within the last decade, we have entered the Fourth Industrial Revolution[6], which is bringing together digital, physical, biological, and technological advances in an integrated fashion. Just as the Second Industrial Revolution triggered the replacement of human physical labor with machines, the Fourth Industrial Revolution is triggering the replacement of human mental labor with artificial intelligence, automation, and other digital innovations. It has been estimated that these technological advances will render over 75 million current jobs obsolete over the next four years while creating 133 million new ones over the same period[8]. These new types of jobs will require new skills that allow humans to productively utilize technology – skills that go beyond physical, cognitive, and soft skills: "digital skills".

Moreover, as Professor Klaus Schwab, the Executive Chairman of the World Economic Forum, said, the Fourth Industrial Revolution that brings innovations such as bionic humans, gene alteration technologies, synthetic biology, and Internet-connected brains, will challenge us to redefine what being a human means[6].

An important aspect to notice is that the Fourth Industrial Revolution has also yielded another shift in the focus of a human's worth - shifting from mind, including knowledge, emotions, and relationships, to spirit, including wisdom and values. This

wisdom, together with contextual understanding and insights, has become more important than practical knowledge and skills, which can now be easily aggregated through the Internet. Universal moral values such as respect, kindness, and compassion make humans unique and distinguishable from machines. Such wisdom and values enable individuals to have a strong identity as a "master of technology" who can fully capitalize on new technologies, and thrive in this fast-changing digital age. Individuals with such agency are encouraged to have agility, adaptability, and lifelong learning aptitude.

Just as IQ and EQ were born after the 2nd and 3rd Industrial Revolutions in the 19th and 20th centuries, respectively, now in the 21st century, we need a new form of intelligence called DQ or "*Digital Intelligence Quotient*". It is a comprehensive set of digital competencies rooted in universal moral values for individuals to use, control, and create technology to advance humanity. DQ aims to address the needs of educational systems, industries, and governments by providing a shared global blueprint to harness technology for a shared prosperous future during this 4th Industrial Revolution and far beyond.

"Our future education and workforce skilling discussion should not focus on how to teach individuals to compete against machines. Technology is only meaningful when it enhances humanity. A horse is faster than a human. But we don't compete against a horse. We ride a horse. We should focus on how to ride and drive AI and technology, not to run against it."

- Dr. Yuhyun Park, at the Sustainable Development Impact Summit 2018, the World Economic Forum
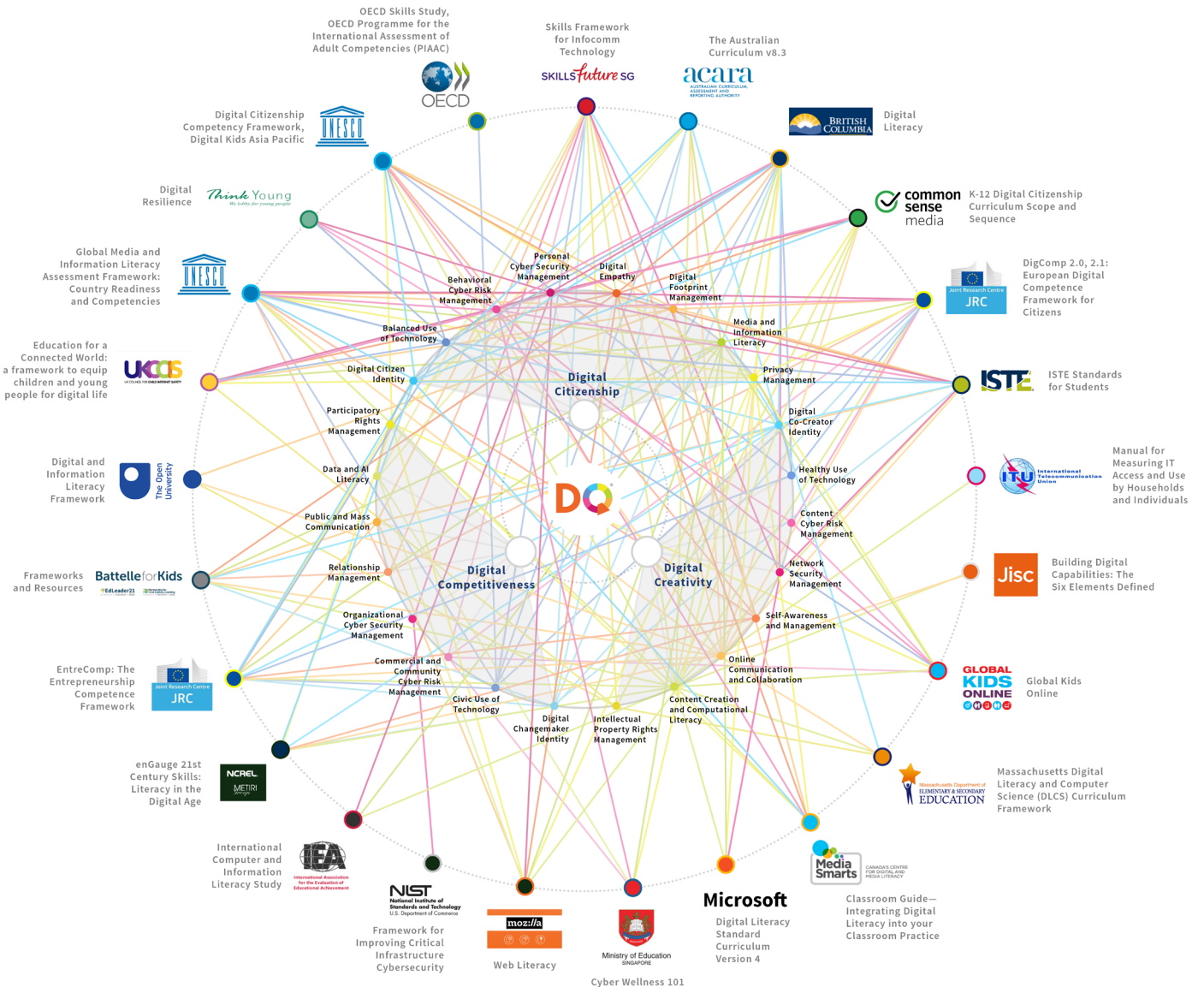
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Common Framework for Digital Literacy, Skills and Readiness

A neutral and impartial platform that aggregates leading ideas, knowledge and practices around the world

Figure 2: 25 Global Approaches and the DQ Framework

Executive Summary

Need for Global Standards

Urgent need to empower individuals with a new form of digital competencies that can help them become ready for the rapid advance of AI and other digital technologies in the near future.

Millions of dollars are being invested in "digital literacy," "digital skills," and "digital readiness" programs across different sectors and countries.

Nevertheless, such efforts have limited coordination and are uneven across covered topics due to the lack of a globally shared understanding and framework for digital competencies and standards.

DQ, A Common Framework

Digital Intelligence (DQ) is a comprehensive set of technical, cognitive, meta-cognitive, and socio-emotional competencies that are grounded in universal moral values and that enable individuals to face the challenges and harness the opportunities of digital life. DQ has three levels, eight areas, and 24 competencies composed of knowledge, skills, attitudes, and values.

Three Key Characteristics

- *All-Embracing Concept:*

  • Overarching concept that encompasses digital literacy, skills, and readiness

  • Common language, systemic structure, and taxonomy created by aggregating over 25 leading frameworks on digital competencies worldwide

- *Adaptable Framework:*

  • Systematic structure built on the OECD Education 2030 Learning Framework that enables flexible national and organizational adoption and customization

  • Built to enhance global agendas, such as OECD's 11 areas of well-being, the Universal Declaration of Human Rights, and UN's Sustainable Development Goals

- *Agile Evolution:*

  • Continuously aggregating knowledge and best practices from around the world on digital literacy and skills education, training and policies to ensure that the framework remains pedagogically and technically up-to-date

  • DQ online tool serving as a living document that enables the DQ Framework to continuously evolve with feedback and early detection of new competencies related to emerging technologies

DQ, Global Standards

The Coalition for Digital Intelligence (CDI), composed of the Organisation for Economic Co-operation and Development (OECD), IEEE Standards Association (IEEE SA), and DQ Institute in association with the World Economic Forum (WEF), is a cooperative network of organizations around the world aiming to improve digital intelligence by defining global standards of digital literacy, skills, and readiness by using the DQ framework and coordinating global efforts across education and technology communities through multi-stakeholder collaboration.

Launched in September 2018, the CDI is working towards institutionalization of the DQ Framework. The roles of each partner are defined as follows:

• DQ Institute to head development and refinement of the DQ Framework.

• IEEE SA to lead official standardization of the DQ Framework.

• OECD to engage with global educational stakeholders for adoption of the DQ Framework.

• WEF to advance global coordination while promoting multi-stakeholder collaborations.

Benefits of Global Standards

• Common framework – including language, understanding, structure, and taxonomy as a point of reference and guiding principle.

• Quality assurance of digital intelligence education, training, assessment, and related policies.

Why Global Standards for Digital Literacy, Skills, and Readiness?

In an increasingly technology-oriented society, digital competencies such as digital literacy, digital skills, and digital readiness have become core requirements for the future- and job-readiness of individuals. The OECD[7], the World Economic Forum (WEF)[8], the World Bank[9], and the United Nations[10] have all identified these competencies as fundamental for our changing world.

However, compared to the exponential speed of connectivity and technology advances, implementation of effective digital competency education, training programs, and policies occur at a far slower pace, and this speed gap is increasingly growing.

Such gaps have yielded serious, unintended negative consequences for individuals as well as for society as a whole.

One of the most serious issues is the worldwide, high prevalence of cyber-risks among children such as cyberbullying, technology addiction, online grooming, the spread of digital misinformation, privacy invasion, security threats, and many others. According to the 2018 DQ Impact Report, more than 50% of 8- to 12-year-old children across 29 countries have been involved in at least one of the following cyber-risks: cyberbullying, video game addiction, offline meetings, and online sexual behavior[12]. This report addressed the imperative to equip children with a holistic set of digital life skills to become ethical and discerning digital citizens who can proac-

tively mitigate various cyber-risks, while maximizing the potential of technology.

On the other hand, the WEF's 2018 Future of Jobs report[8] stressed an "upskilling imperative" for the workforce in an increasingly digitized world. Without a doubt, a workforce sufficiently equipped with a comprehensive set of digital competencies would have a greater chance of standing to gain from new job opportunities arising from technological advances.

However, a lack of digital competencies among adults is another big issue for industries and nations. A digital skills readiness report published in 2016 by the UK Science and Technology Committee of the House of Commons concluded that 23% of the adult population in the UK lacks basic digital skills, which cost the national economy an estimated 63 billion pounds per year in lost GDP – a situation which the report referred to as a "digital skill crisis"[16].

In summary, the digital competencies should include not only the technical skills one might expect but also comprehensive competencies that include digital safety, digital rights, and digital emotional intelligence. In other words, these competencies should allow people to not just use a computer or smartphone, but to deal with the modern social and economic challenges and demands resulting from technological advances.

Moreover, for communities already at the margins of society, the question of how digital inclusion and upskilling should be addressed cannot be underestimated. Evidence of an ever-widening digital competency gap among people in developing countries, underprivileged communities of low-socioeconomic status, women, seniors, and/or children changes the calculus in our understanding of where to channel resources for skill-building programs and initiatives: the socioeconomic and political implications of escalating economic and social inequalities are huge. Here, the imperative is immediate and requires scalable and sustainable efforts.

In order to address these digital competency gaps, today, governments, companies, and organizations are spending millions of dollars on digital competency education, and training. However, at present, there is no shared, global understanding of what terms such as "digital literacy," "digital skills," and "digital readiness" mean. Across sectors, for example, "digital skills," "digital literacy", "digital readiness", and "digital competency" are used interchangeably: technology developers often use the term "digital skills," where "skill" is a component of a "competency" used by educators and academia. In contrast, the term "digital literacy" as commonly used by the education community is categorized as one of many "skills" in the industry community.

This leads to the use of different—but overlapping—terminologies and initiatives across different sectors, communities, and nations. This predicament leads to current efforts lacking coordination, scalability, and comprehensive scope. At present, addressing how to sustain and improve best practices is difficult, if not impossible.

Moreover, it also makes meaningful monitoring and reporting difficult. In the absence of a common understanding of digital competencies including digital literacy, skills and readiness, we leave ourselves unequipped not only to understand the current progress of digital competency movements in the world today, but also to grapple with *what form*s of digital competency should be taught and to *whom*.

For the world to build comprehensive digital competencies with speed, scalability, and sustainability, there is an urgent need for effective coordination and consensus towards building a common framework with a set of definitions, structure, and taxonomy.

To address these needs, the Coalition for Digital Intelligence (CDI), a platform created in association with the World Economic Forum (WEF) and formed jointly by the DQ Institute, Organization for Economic Co-operation and Development (OECD), and IEEE Standards Association (IEEE), was started on 26 September 2018 with the aim of establishing a global, common language and set of norms around digital competencies, and coordinating global actions[15].

As part of its efforts, this 2019 DQ Global Standards Report is the first attempt to define the DQ framework as the common framework of digital literacy, skills, and readiness that can be globally used as a reference framework across the education and technology sectors. Subsequently, the DQ Global Standards Report will be published on an annual basis with updated framework based on new knowledge, best practices, and feedback that is aggregated through the CDI network while staying attuned to new technology advances.

Digital Intelligence (DQ) Framework

Background

The DQ framework was created by Dr. Yuhyun Park and developed through an academically rigorous process by her research team based at various universities including Nanyang Technological University, the National Institute of Education in Singapore, Iowa State University and many others. She first published the DQ concept and structure in two articles[13,14] published by the World Economic Forum in 2016. Since then, the DQ framework have been widely used by various organizations including international organizations, local and national governments, industries, and schools. Moreover, The #DQEveryChild initiative, a global education movement seeking to empower "every" child worldwide with DQ digital citizenship, has been reached to children across 107 countries in collaboration with the World Economic Forum, Singtel, Turkcell, and Twitter among over 100 partners from around the world.

The DQ framework was later identified as a best practice to be used as global industry standards for digital skills by the IEEE Digital Literacy Industry Connections Program. It was subsequently agreed to be used as a common framework for digital literacy, skills, and readiness by the Coalition for Digital Intelligence. In 2019, the DQ framework was updated as part of a collaboration with the OECD Education 2030 Framework and including refinement based on learning from the best practices of 25 leading global approaches in digital competencies worldwide.

Definition

Digital Intelligence (DQ) is a comprehensive set of technical, cognitive, meta-cognitive, and socio-emotional competencies grounded in universal moral values that enable individuals to face the challenges of digital life and adapt to its demands. Thus, individuals equipped with DQ become wise, competent, and future-ready digital citizens who successfully use, control, and create technology to enhance humanity.

Figure 3: 2019 Digital Intelligence (DQ) Framework
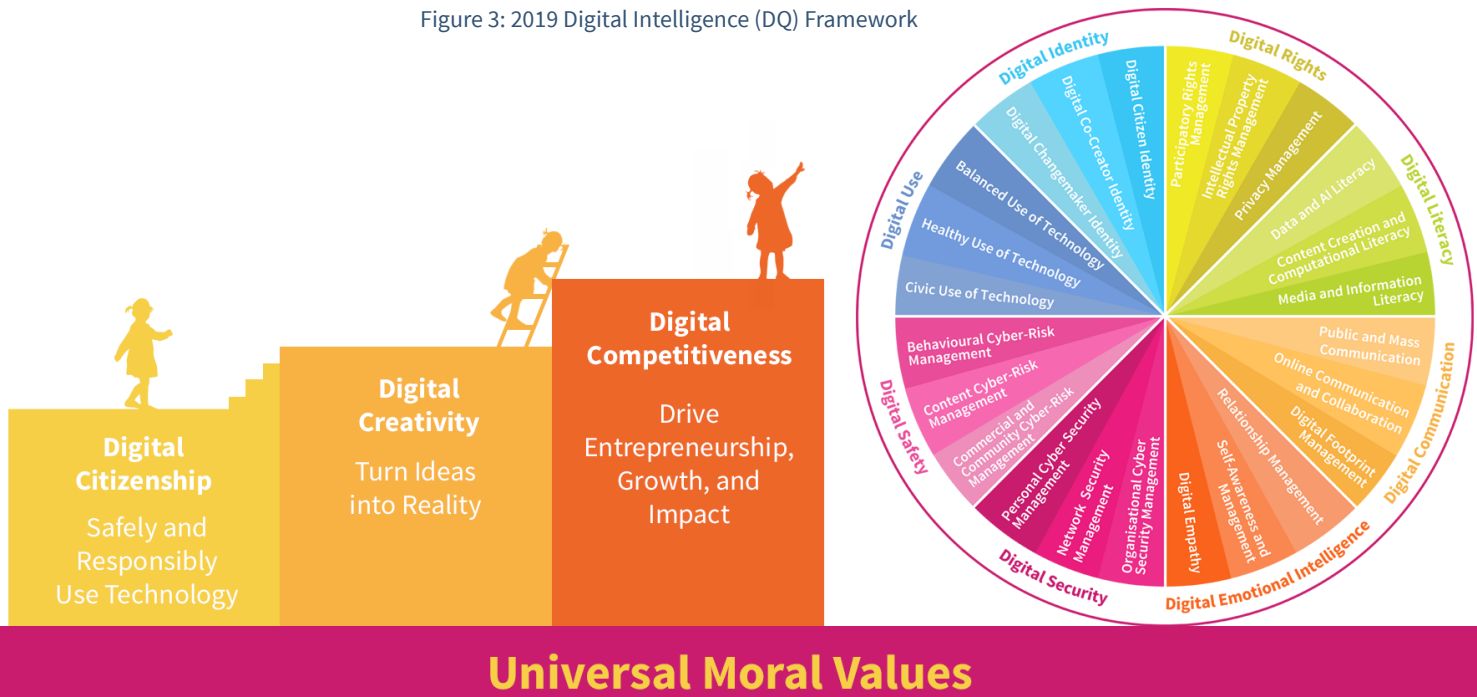
Characteristics

1 All-embracing

A. *Overarching Concept*

DQ has been conceptualized as an umbrella term for organizing "digital skills," "digital literacy," and "digital readiness" across all sectors and demographic groups. This allows the concept to bring together the educational agendas of "digital literacy" with industry efforts to develop "digital skills" that encompass a broad range of competencies: digital citizenship, digital resilience, media and information literacy, job readiness, entrepreneurship, and more.

B. *Aggregating Leading Frameworks*

With this overarching concept, the DQ Framework aggregates 25 leading frameworks on digital literacy and skills from around the world. The identified competencies were mapped against the existing DQ Framework and contributed to the development of the updated DQ Framework's resulting definition, understanding, and taxonomy.

"The concept of DQ provides a universal standard from which a more comprehensive understanding of the need for digital skills can be developed. This allowed us to build on existing initiatives and set out the actions we need to take. As a framework, DQ provides a basis for measurement and comparison, in the same way as IQ has been used until now."

- The Rt Hon the Lord Mayor of the City of London Alderman Peter Estlin

2 Adaptable Framework

The DQ Framework offers a holistic set of digital competencies with a systematic structure as a reference framework. The aim is to enable any organization to adopt the DQ Framework, and to be able to practically tailor the framework to meet their needs. Any government, company, or school can easily adopt the DQ Framework and customize it to their own needs based on their educational aims and cultural background.

Systemic Structure

Figure 4: Structure of the DQ Framework
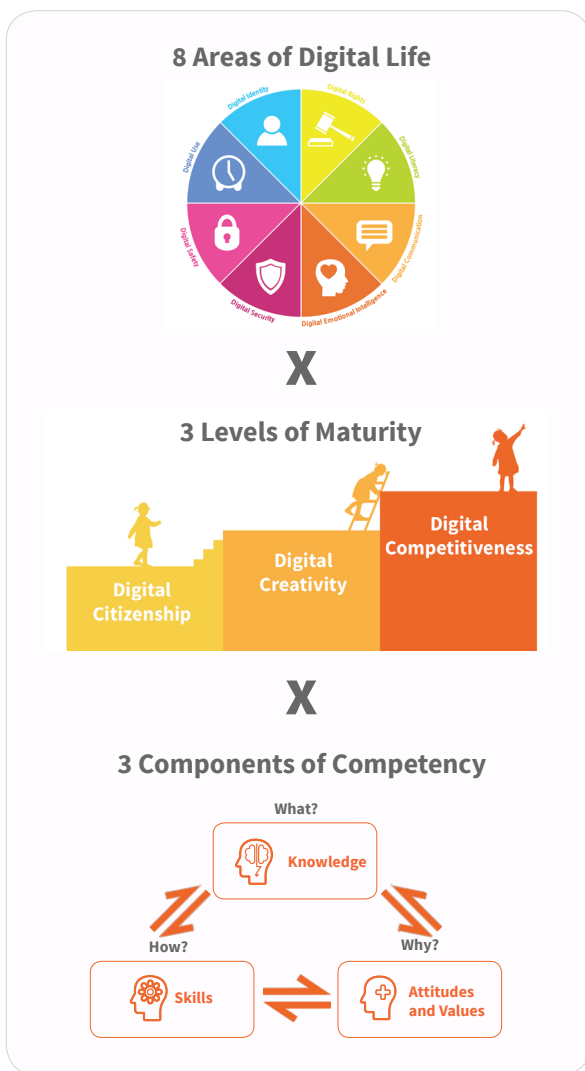
The DQ Framework is structured around two categories: "areas" and "levels" of digital intelligence. Eight broad areas of one's digital life have been identified: Digital Identity, Digital Use, Digital Safety, Digital Security, Digital Emotional Intelligence, Digital Communication, Digital Literacy, and Digital Rights. The competencies within these eight areas can be further differentiated by three different "levels" of maturity—Digital Citizenship, Digital Creativity, and Digital Competitiveness—allowing learning to proceed based on what may be most relevant to an individual's life at the present moment. In total, this creates an eight-by-three matrix of 24 competencies. Furthermore, guided by the structure of the OECD Education 2030 Learning Framework, each of these 24 competencies can be differentiated by a selection of knowledge, skills, attitudes, and values.

This approach aligns well with the OECD Education 2030 Learning Framework, the UN Sustainable Development Goals (SDGs), Universal Declaration of Human Rights, and the OECD Well-Being Indicators. Essentially, the goal is to inculcate digital intelligence in individuals, enabling them to move beyond just hard skills and harness the power of the digital world to shape their lives. These competencies are learnable, and once learned can help to maximize the benefits of technologies while minimizing the harms, both in our personal and work lives.

Figure 5: The DQ Framework in alignment with the OECD Education 2030 Framework and UN SDGs

Source: The Future of Education and Skills, Education 2030, OECD, UN SDGs

3 Agile Evolution

The DQ Framework has been designed to continuously update and evolve through further knowledge aggregation and feedback.

It will continuously aggregate knowledge and best practices from around the world on digital literacy and skills education, training, and policies to ensure that the framework remains pedagogically and technically up-to-date.

Moreover, the DQ online tool will serve as a living document that enables the DQ Framework to continuously evolve with real-time feedback and early detection of new competencies by proactively mapping existing and new digital literacy and skills frameworks, educational and training programs, and policies against the DQ framework.

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Structure and Taxonomy

Eight DQ Areas

As described above, DQ is a new form of intelligence which is a comprehensive set of technical, cognitive, meta-cognitive, and socio-emotional competencies grounded in universal moral values that enable individuals to adapt to the demands of digital life.

DQ aims to cover all areas of individuals' digital life that range from personal and social identities of individuals to their use of technology including device and media, their online communication and collaboration at work or at leisure, their practical, operational and technical capabilities that are critical for daily digital lives and professional careers, potential safety and security issues related to technology, emotional and relational aspects and human rights in the digital age. Moreover, with "*respect*" being a fundamental moral principle of the Universal Declaration of Human Rights (UDHR), the guiding principles of an individual's digital life are: respect for human rights, dignity, and worth of the person in all area of their digital life.

This approach results in the following 8 areas:

Digital Identity, Digital Use, Digital Safety, Digital Security, Digital Emotional Intelligence, Digital Communication, Digital Literacy, and Digital Rights, and Table 1 summarizes each of the eight areas of DQ, its definition, and its guiding principles.

Table 1: 8 Areas of DQ

Digital Identity
The ability to build a wholesome online and offline identity.
Guiding Principle: Respect for oneself

Digital Use
The ability to use technology in a balanced, healthy, and civic way.
Guiding Principle: Respect for time and the environment

Digital Safety
The ability to understand, mitigate and manage various cyber-risks through safe, responsible, and ethical use of technology.
Guiding Principle: Respect for life

Digital Security
The ability to detect, avoid, and manage different levels of cyber threats to protect data, devices, networks, and systems.
Guiding Principle: Respect for property

Digital Emotional Intelligence
The ability to recognize, navigate, and express emotions in one's digital intra- and inter-personal interactions.
Guiding Principle: Respect for others

Digital Communication
The ability to communicate and collaborate with others using technology.
Guiding Principle: Respect for reputation and relationships

Digital Literacy
The ability to find, read, evaluate, synthesize, create, adapt, and share information, media, and technology.
Guiding Principle: Respect for knowledge

Digital Rights
The ability to understand and uphold human rights and legal rights when using technology.
Guiding Principle: Respect for rights

Three DQ Levels

Individuals can develop a deeper understanding and mastery of digital competencies, as well as progress their digital daily life, job, and professional careers throughout their lifetimes. Thus, DQ can be divided into three distinct levels (Table 2).

Digital Citizenship is a set of fundamental digital life skills that everyone needs to have. We suggest that such educational opportunities should be free and compulsory, especially at early stages as basic human rights for individuals in the digital age. Digital Creativity cover more advanced competencies of digital literacy, skills, and readiness as individuals become active members of the digital ecosystem and create economical and societal values through their participation, creation, and innovation. Moreover, Digital Competitiveness is a higher-order capability for individuals to perform effectively as members of the digital economy who fuel entrepreneurship, create jobs, produce social impact, and spur economic growth.

Table 2: 3 Levels of DQ

Digital Citizenship
The ability to use digital technology and media in safe, responsible, and ethical ways.

Digital Creativity
The ability to become a part of the digital ecosystem, and to create new knowledge, technologies, and content to turn ideas into reality.

Digital Competitiveness
The ability to solve global challenges, to innovate, and to create new opportunities in the digital economy by driving entrepreneurship, jobs, growth and impact.

24 DQ Competencies

With three levels of DQ across eight areas, the following 24 competencies (Table 3) have been identified based on aggregation of 25 existing frameworks. Details of these frameworks can be found in Appendix 1.

Table 3: 24 DQ Competencies

	Digital Identity	Digital Use	Digital Safety	Digital Security	Digital Emotional Intelligence	Digital Communication	Digital Literacy	Digital Rights
Digital Citizenship	1 Digital Citizen Identity	2 Balanced Use of Technology	3 Behavioral Cyber-Risk Management	4 Personal Cyber Security Management	5 Digital Empathy	6 Digital Footprint Management	7 Media and Information Literacy	8 Privacy Management
Digital Creativity	9 Digital Co-Creator Identity	10 Healthy Use of Technology	11 Content Cyber-Risk Management	12 Network Security Management	13 Self-Awareness and Management	14 Online Communication and Collaboration	15 Content Creation and Computational Literacy	16 Intellectual Property Rights Management
Digital Competitiveness	17 Digital Changemaker Identity	18 Civic Use of Technology	19 Commercial and Community Cyber-Risk Management	20 Organizational Cyber Security Management	21 Relationship Management	22 Public and Mass Communication	23 Data and AI Literacy	24 Participatory Rights Management

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1. **Digital Citizen Identity:** The ability to build and manage a healthy identity as a digital citizen with integrity.

2. **Balanced Use of Technology:** The ability to manage one's life both online and offline in a balanced way by exercising self-control to manage screen time, multitasking, and one's engagement with digital media and devices.

3. **Behavioral Cyber-Risk Management:** The ability to identify, mitigate, and manage cyber-risks (e.g., cyberbullying, harassment, and stalking) that relate to personal online behaviors.

4. **Personal Cyber Security Management:** The ability to detect cyber threats (e.g., hacking, scams, and malware) against personal data and device, and to use suitable security strategies and protection tools.

5. **Digital Empathy:** The ability to be aware of, be sensitive to, and be supportive of one's own and other's feelings, needs and concerns online.

6. **Digital Footprint Management:** The ability to understand the nature of digital footprints and their real-life consequences, to manage them responsibly, and to actively build a positive digital reputation.

7. **Media and Information Literacy:** The ability to find, organize, analyze, and evaluate media and information with critical reasoning.

8. **Privacy Management:** The ability to handle with discretion all personal information shared online to protect one's and others' privacy.

9. **Digital Co-Creator Identity:** The ability to identify and develop oneself as a co-creator of the digital ecosystem.

10. **Healthy Use of Technology:** The ability to understand the benefits and harms of technology on one's mental and physical health and to use technology use while prioritizing health and well-being.

11. **Content Cyber-Risk Management:** The ability to identify, mitigate, and manage content cyber-risks online (e.g., harmful user-generated content, racist/hateful content, image-based abuse).

12. **Network Security Management:** The ability to detect, avoid, and manage cyber threats to cloud-based collaborative digital environments.

13. **Self-Awareness and Management:** The ability to recognize and manage how one's value system and digital competencies fits with one's digital environment.

14. **Online Communication and Collaboration:** The ability to use technology effectively to communicate and collaborate collectively, including at a distance.

15. **Content Creation and Computational Literacy:** The ability to synthesize, create, and produce information, media, and technology in an innovative and creative manner.

16. **Intellectual Property Rights Management:** The ability to understand and manage intellectual property rights (e.g., copyrights, trademarks, and patents) when using and creating content and technology.

17. **Digital Changemaker Identity:** The ability to identify and develop oneself as a competent changemaker in the digital economy.

18. **Civic Use of Technology:** The ability to engage in civic participation for the well-being and growth of local, national, and global communities using technology.

19. **Commercial and Community Cyber-Risk Management:** The ability to identify, mitigate, and manage commercial or community cyber-risks online, such as organizational attempts to exploit individuals financially or through ideological persuasion (e.g., embedded marketing, online propaganda, and gambling).

20. **Organizational Cyber Security Management:** The ability to recognize, plan, and implement organizational cyber security defenses.

21. **Relationship Management:** The ability to skillfully manage one's online relationships through cooperation, conflict management, and persuasion.

22. **Public and Mass Communication:** The ability to communicate with an online audience effectively to exchange messages, ideas, and opinions reflecting wider business or societal discourses.

23. **Data and AI Literacy:** The ability to generate, process, analyze, present meaningful information from data and develop, use, and apply artificial intelligence (AI) and related algorithmic tools and strategies in order to guide informed, optimized, and contextually relevant decision-making processes.

24. **Participatory Rights Management:** The ability to understand and exercise one's powers and right to online participation (e.g., their rights to personal data protection, freedom of expression, or to be forgotten)

The OECD Education 2030 suggests that the development of a "competency" involves "the mobilization of knowledge, skills, attitudes and values to meet complex demands."[7] In other words, individuals need:

**Knowledge**
disciplinary, epistemic, and procedural

Skills
a broad range of skills—cognitive, social, emotional, practical, physical— to apply their knowledge in unknown and evolving circumstances

Attitudes and Values
attitudes and values that guide how knowledge and skills are used at personal, local, societal, and global levels to meet challenges and opportunities

Using the OECD Education 2030 Learning Framework (Figure 7) as a compass for building upon he DQ competencies, each DQ competency can be further broken down into three components of knowledge, skills, and attitudes and values. This section details the 24 DQ Competencies and breaks down their corresponding components.

Figure 7: OECD Education 2030 Learning Framework

Source: The Future of Education and Skills, Education 2030, OECD

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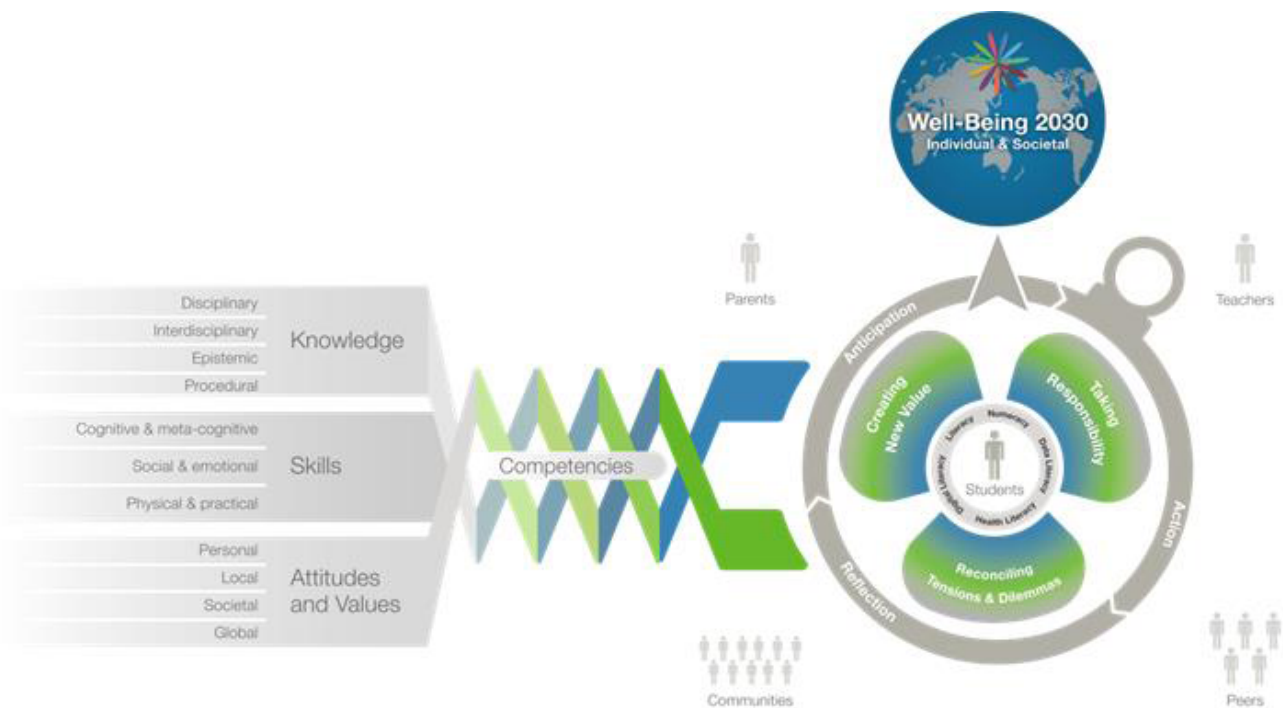
Taxonomy of 24 DQ Competencies

Table 4: Components of Digital Citizen Identity

1. Digital Citizen Identity
The ability to build and manage a healthy identity as a digital citizen with integrity.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the basic vocabulary needed for discussing the media landscapes in which they are embedded; the social and multi-cultural nature of digital media and technologies; the construction of their self-image and persona in the digital environment; and the impact that technology may have on their self-image and values (e.g., body images, gender stereotypes that may be idealized in digital media such as video game or advertising, and racial stereotypes that may be embedded in the system), and how personal use of digital media may have professional implications.	**1, 2, 3, 5, 10, 16**
Skills	Individuals are able to demonstrate ethical and considerate behavior and netiquette when using technology across different audiences, to control and shape their own digital identity by creating and curating their online identities to tell their stories while engaging with others from different cultures and possessing global awareness in a way that demonstrates non-discriminatory and culturally sensitive behavior.	**1, 2, 3, 5, 10, 16, 20, 21, 24**
Attitudes and Values	Individuals exhibit coherency and integrity across online and offline behaviors, honesty when using technology, and demonstrate self-efficacy by finding ways to take advantage of the opportunities afforded to them online.	**5, 21**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 5: Components of Balanced Use of Technology
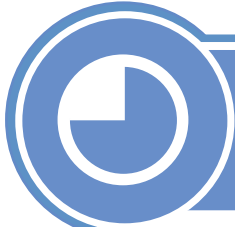
2. Balanced Use of Technology

The ability to manage one's life both online and offline in a balanced way by exercising self-control to manage screen time, multitasking, and one's engagement with digital media and devices.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the nature and impact of technology use (e.g., excessive screen time, multi-tasking) on their health, work productivity, well-being, and lifestyles, and have appropriate knowledge to deal with these impacts.	**2, 5, 8, 20, 21, 24**
Skills	Individuals are able to assess health risks and reduce technology-related issues to better self-regulate their technology usage; in doing so, they become able to develop time and resource management skills to more successfully perform tasks and more safely enjoy entertainment.	**2, 5, 10, 18, 20, 22, 24**
Attitudes and Values	By using technology with purpose-driven intentions, individuals exhibit integrity by adhering to goals in terms of screen time and technology usage, and develop positive relationships with others through the self-regulated use of technology.	**2, 8, 20, 21, 24**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 6: Components of Behavioral Cyber-Risk Management

3. Behavioral Cyber-Risk Management
The ability to identify, mitigate, and manage cyber-risks (e.g., cyberbullying, harassment, and stalking) that relate to personal online behaviors.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the different types of behavioral cyber-risks (e.g., cyberbullying, harassment, and stalking), how they might encounter these risks, how these risks might affect them, and how they can formulate strategies for dealing with them.	**2, 3, 4, 5, 8, 12, 20, 21, 24**
Skills	Individuals are able to develop the appropriate technical, socio-cognitive, communicative, and decision-making skills to address behavioral cyber-risk incidents as they occur, whether as a bystander or victim, and gain valuable coping tools to address these negative online experiences.	**2, 3, 4, 8, 10, 21, 22, 24**
Attitudes and Values	Individuals exhibit kindness when online, know the supportive framework in place to address risks, and are able to manage their online behavior as part of contributing to positive and supportive online communities.	**3, 4, 8, 22**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 7: Components of Personal Cyber Security Management

4. Personal Cyber Security Management

The ability to detect cyber threats (e.g., hacking, scams, and malware) against personal data and device, and to use suitable security strategies and protection tools.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand their personal online risk profiles and how to identify different types of cyber threats (e.g., hacking, scams, and malware), and also identify available strategies and tools they can use to avoid such threats.	**2, 4, 5, 15, 20, 21, 22**
Skills	Individuals are able to identify cyber threats, use relevant cyber security practices (e.g., secure passwords, firewalls, and anti-malware applications), and use technology without compromising their data and devices.	**2, 3, 4, 5, 13, 15, 20, 22**
Attitudes and Values	Individuals exhibit resilience and vigilance against careless or negligent behaviors that may compromise their own or others' data and device security, and have confidence about what to do when there is a problem.	**4, 5, 20, 22**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 8: Components of Digital Empathy

5. Digital Empathy
The ability to be aware of, be sensitive to, and be supportive of one's own and other's feelings, needs and concerns online.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand how their online interactions might affect others' feelings and recognize how others may be influenced by their online interactions (e.g., effects of online trolls).	**2, 5, 17, 20, 24**
Skills	Individuals develop socio-emotional skills by becoming sensitive to and respecting others' perspectives and emotions through synchronous and asynchronous interactions online and are able to regulate and respond accordingly.	**3, 5, 10, 13, 17, 20, 21, 24**
Attitudes and Values	Individuals demonstrate an awareness and compassion for the feelings, needs, and concerns of others online.	**17**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 9: Components of Digital Footprint Management

6. Digital Footprint Management
The ability to understand the nature of digital footprints and their real-life consequences, to manage them responsibly, and to actively build a positive digital reputation.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the concept of digital footprints, the consequences that such trails of information and corresponding metadata may have on their reputation and others, and the possible uses of such information when shared online.	**2, 4, 5, 19, 20, 24**
Skills	Individuals are able to manage their digital footprints and use technology in a manner that contributes to a positive reputation both for themselves and the organization they belong to.	**4, 5, 10, 21, 24**
Attitudes and Values	Individuals exhibit mindful care, prudence and responsibility online, with the goal of actively managing the types of information that may be shared, tagged, released, gathered, and collected by themselves and others across multiple platforms throughout time.	**21, 24**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 10: Components of Media and Information Literacy

7. Media and Information Literacy
The ability to find, organize, analyze, and evaluate media and information with critical reasoning.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the basic structure of the digital media, how the use of digital media influences knowledge and information acquisition and management, the distinct and varied reasons for the construction of specific media messages, and the reasons behind campaigns of disinformation and misinformation online.	1, 2, 13, 15, 17, 18, 20, 21
Skills	Individuals have proficient computer operation skills and are able to use productivity software or applications that enable them to gather and organize digital content. Moreover, individuals are able to articulate their information and content needs, effectively navigate, critically evaluate, and synthesize information and content that they encounter online.	1, 2, 4, 8, 11, 12, 13, 15, 18, 21
Attitudes and Values	Individuals are careful and critical of the information that they encounter when online, exhibiting discernment in their evaluation of the reliability and credibility of online information.	1, 2, 12, 15, 17, 20, 21

* An index of the frameworks listed in this column can be found in Appendix 1

Table 11: Components of Privacy Management

8. Privacy Management
The ability to handle with discretion all personal information shared online to protect one's and others' privacy.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the concept of digital footprints, the consequences that such trails of information and corresponding metadata may have on their reputation and others, and the possible uses of such information when shared online.	**2, 3, 4, 8, 11, 12, 13, 20, 24**
Skills	Individuals are able to manage their digital footprints and use technology in a manner that contributes to a positive reputation both for themselves and the organization they belong to.	**3, 4, 8, 10, 11, 13, 21, 24**
Attitudes and Values	Individuals exhibit respect for their own and others' privacy and personal information, treating these as valuable and personal assets worth protecting.	**3**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 12: Components of Digital Co-Creator Identity

9. Digital Co-Creator Identity
The ability to identify and develop oneself as a co-creator of the digital ecosystem.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand how to keep up with advancements in information and communication technology as well as integrate digital technologies into their everyday lives in a way that is complementary and productive rather than disruptive. In turn, they learn to be open to experimenting with new technology and when to reject them. In doing so, they can seek out co-creation opportunities (e.g., new models of products or services) borne from these technological progressions in the digital ecosystem.	1, 2, 9, 18, 25
Skills	With a healthy identity as a co-creator of the digital ecosystem, individuals are able to explore and identify present-day problems and issues. They develop and build higher-order thinking and reasoning skills that further aid their capacity and connect with others. In turn, they build on existing ideas and further co-develop new ideas to solve them using technology. As lifelong learners, they continuously learn and generate new ideas to solve problems efficiently.	1, 5, 16, 17, 18, 21,25
Attitudes and Values	Individuals express self-motivation and resourcefulness when using technology—whether by taking initiative or by knowing when and how to deploy and allocate their time, efforts, and resources.	2, 9, 16, 17, 18, 25

* An index of the frameworks listed in this column can be found in Appendix 1

Table 13: Components of Healthy Use of Technology

10. Healthy Use of Technology

The ability to understand the benefits and harms of technology on one's mental and physical health and to use technology use while prioritizing health and well-being.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the contexts that shape discourses about the impact of technology on their well-being and are able to discern how to effectively use technology for their own benefit.	**2, 4**
Skills	Individuals are able to use technology ergonomically. Physiological awareness helps users identify safe, comfortable practices and equipment for mentally and physically beneficial work processes.	**4, 18, 24**
Attitudes and Values	Individuals value mental and physical health and actively self-regulate their use of technology in a healthy way.	**4**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 14: Components of Content Cyber-Risk Management

11. Content Cyber-Risk Management
The ability to identify, mitigate, and manage content cyber-risks online
(e.g., harmful user-generated content, racist/hateful content, image-based abuse).

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand content cyber-risks that they face online (e.g., harmful user-generated content such as racist, hateful, discriminatory content/images, or image-based abuse), and the strategies involved in dealing with them.	**4, 8, 22**
Skills	Individuals become better equipped to develop and use conflict management techniques to mitigate such risks, whether through avoiding or confronting individuals or groups involved in the creation of such content, reporting incidents to platform administrators, or other appropriate processes.	**8, 22**
Attitudes and Values	Individuals exhibit resilience and fortify themselves against content that may be hurtful or derogatory while proactively contributing to a healthy, open, and supportive online community.	**8, 22**

* An index of the frameworks listed in this column can be found in Appendix 1

12. Network Security Management
The ability to detect, avoid, and manage cyber threats to cloud-based collaborative digital environments.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand cyber threats specific to cloud networks and collaborative digital environments that may compromise their data, devices, and systems, and the options available to them for ensuring appropriate levels of protection, confidentiality, and privacy.	**2, 5, 11, 25**
Skills	Individuals are able to predict and identify weaknesses and risks in their networks that leave them vulnerable to possible cyber threats. They evaluate vulnerabilities, quantify associated risks (e.g., business loss), employ tools, strategies, and protocols to ensure and improve the confidentiality and security of their collaborative work. Additionally, they monitor their networks and systems and implement support systems to allow for optimum productivity and performance. If individuals belong to an organization, their security tools and strategies are aligned with their organization's security framework, guidelines, and technical requirements to ensure minimal impact to their business.	**25**
Attitudes and Values	Individuals continuously take the initiative to stay up-to-date about evolving cyber threats, risk profiles, and network vulnerabilities when using technology.	**25**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 16: Components of Self-Awareness and Management

13. Self-Awareness and Management

The ability to recognize and manage how one's value system and digital competencies fits with one's digital environment.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand how their own value systems influence and are influenced by their digital environments, and become equipped to explain how one's mood can affect others.	**18, 21**
Skills	Individuals are able to identify and explain their emotions, reflect on how their feelings may be influenced by their digital experiences, and manage their moods and impulses accordingly with active self-regulation. In addition, they are able to stay aware of their own level of digital competence and actively work to manage and update their skillset. They manage their emotions as well as competencies to foster cooperation and positive interactions between internal and external stakeholders in order to fulfill their goals.	**16, 18, 21, 25**
Attitudes and Values	Individuals exhibit an awareness of their own moods and are actively able to manage their impulses accordingly, thereby respecting others during online communication.	**18**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 17: Components of Online Communication and Collaboration

14. Online Communication and Collaboration
The ability to use technology effectively to communicate and collaborate collectively, including at a distance.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand different types of peer-to-peer communication and collaboration strategies, tools, and formats, and decide which methods are most effective for individual or collaborative goals. In addition, they understand the various social and market pressures that may encourage or discourage communication and/or collaboration across certain groups.	**1, 2, 3, 4, 5, 9, 17, 18, 19, 21, 24**
Skills	Individuals are able to develop socio-emotional, interpersonal, and cognitive skills that support their communication and collaborative efforts. These skills include the capacity to interact and collaborate with an online community of peers and experts for the construction and co-creation of knowledge. They are also able to leverage on their technical skills to efficiently exchange ideas and work together even at a distance through utilizing a variety of different communication channels.	**1, 2, 4, 5, 7, 9, 16, 17, 18, 19, 21, 24, 25**
Attitudes and Values	Individuals exhibit initiative and positive attitudes towards technology use that enable and support collaboration and productivity. They also exhibit an inclusive attitude that fosters positive collaboration culture and teamwork while achieving organizational goals (e.g., helping others build positive digital reputations through skill endorsements or reviews).	**2, 5, 17, 18, 25**

* An index of the frameworks listed in this column can be found in Appendix 1

15. Content Creation and Computational Literacy
The ability to synthesize, create, and produce information, media, and technology in an innovative and creative manner.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the theory of digital content creation and computational thinking and possess algorithmic literacy such as programming and digital modelling.	1, 3, 4, 5, 8, 9, 11, 13, 15, 16, 21
Skills	Individuals are able to conceptualize, build on, organize, create, adapt, and share knowledge, digital content, and technology. They access needs, synthesize knowledge and ideas across a variety of disciplines to make decisions and co-operate with others, identify and use data digital media tools and technology to solve problems, and adjust and customize digital environments to suit personal, organizational, and community needs. They are able to share information and knowledge and create and execute plans for the design of digital creations (e.g., content, software or hardware) based on needs as well as practicality, efficiency, and functionality. Moreover, they exhibit computational thinking —selection and application of algorithms, interpretation of data, and usage of advanced computational methods to achieve desired results, tasks and/or address specific issues or requirements. Furthermore, they develop applications in line with a specified design as well as existing development and security standards and are able to analyze components and reuse, improve, reconfigure, add, or integrate as needed. They also ensure a seamless user experience of their digital creation by prioritizing ease of usage, including visual, technical, and functional elements in the interface design as well as configuring their end creations to efficiently deploy releases to different platforms and operating systems.	1, 2, 4, 5, 6, 7, 8, 9, 10, 13, 15, 17, 18, 21, 24, 25
Attitudes and Values	Individuals express self-motivation and resourcefulness when using technology—whether by taking initiative or by knowing when and how to deploy and allocate their time, efforts, and resources.	4, 21

* An index of the frameworks listed in this column can be found in Appendix 1

16. Intellectual Property Rights Management

The ability to understand and manage intellectual property rights (e.g., copyrights, trademarks, and patents) when using and creating content and technology.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand legislation and rights around ownership and remixing of digital creations (e.g., digital rights management technologies, plagiarism, copyright, fair use, licensing) and are able to distinguish between creative use and appropriation of others' work.	**2, 3, 9, 19, 20, 24**
Skills	Individuals distinguish between digital creations that can be legally downloaded and that which must be paid for. They utilize strategies (such as trademarks, creative commons, and copyrights) for protecting their own and others' digital creations—in addition to content created collaboratively—through a variety of tools and legislation. Moreover, they track and manage changes in their digital creations in order to protect their own/organizational assets from unauthorized change, use, and deviation.	**9, 19, 20, 25**
Attitudes and Values	Individuals build trust, exhibit responsibility, self-respect, and respect for others by protecting their own digital creations and crediting others' creations when appropriate.	**9, 20**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 20: Components of Digital Changemaker Identity

17. Digital Changemaker Identity
The ability to identify and develop oneself as a competent changemaker in the digital economy.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand general and emerging trends within digital environments, how the use of technology shapes and is shaped by globalization and interdependent networks, and the need to recognize emerging problems that technology can create and address. They identify and evaluate innovative business or social impact opportunities provided by new technology advances.	1, 2, 4, 5, 17, 18
Skills	Individuals develop higher order thinking skills by extending their thinking beyond the individual scale to integrate digital networks and tools in response to broader social and economic issues. They monitor and integrate emerging technology trends and developments, structured data gathering for the identification of new and emerging technological products/services identifying the potential value add to the business, and in doing so, become better equipped to manage and complete projects that address such issues and to develop a business strategy for sustainability and profitability.	1, 4, 5, 16, 17, 18, 25
Attitudes and Values	Individuals express self-motivation and resourcefulness when using technology—whether by taking initiative or by knowing when and how to deploy and allocate their time, efforts, and resources.	1, 2, 4, 16, 17, 18

* An index of the frameworks listed in this column can be found in Appendix 1

18. Civic Use of Technology

The ability to engage in civic participation for the well-being and growth of local, national, and global communities using technology.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the importance of community engagement and civic participation that meet the quality expectations and standards that are aligned with the individuals' and/or organizational values and business objectives and the well-being of their local, national, and global communities.	1, 2, 4, 13, 18, 21, 23, 25
Skills	Individuals are able to organize and rally a group online or know how to participate in an organized online group for effecting change that they aim to create. In doing so, they are better equipped to engage with individuals or groups through various digital media, to develop and review procedures, to participate in synchronous and asynchronous discussions, to create shared values, and to positively influence their communities through appropriate technologies.	1, 2, 4, 13, 18, 21,23, 25
Attitudes and Values	Individuals exhibit a belief in and respect for civic engagement and are willing to become involved in their communities for the betterment of their own organizations and/or society.	18, 21

* An index of the frameworks listed in this column can be found in Appendix 1

Table 22: Components of Commercial and Community Cyber-Risk Management

19. Commercial and Community Cyber-Risk Management

The ability to identify, mitigate, and manage commercial or community cyber-risks online, such as organizational attempts to exploit individuals financially or through ideological persuasion (e.g., embedded marketing, online propaganda, and gambling).

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand different types of commercial or community cyber-risks (e.g., embedded marketing, online propaganda, and gambling), their contextual exposure to such risks as members of specific communities and groups, and demonstrate depth and currency of knowledge about legal and ethical issues related to commercial and community cyber-risks.	**4, 8, 25**
Skills	Individuals become familiar with the strategies involved in dealing with these risks. They are able to identify and/or develop strategies and tools (e.g., ad blockers and Web extensions) to mitigate and manage exposure to risks and enhance quality of life. They detect and report incidents, identify affected systems and user groups, and trigger alerts and announcements to relevant stakeholders and efficient resolution of the solution. They manage the lifecycle of problems to prevent problems and incidents from occurring, eliminate recurring incidents, and minimize the impact of unavoidable incidents.	**4, 8, 25**
Attitudes and Values	Individuals exhibit caution and vigilance when online, understand where and when strategies for dealing with risks may be available to them, and devise creative ways to handle and avoid the dangers associated with these risks.	**8, 12**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 23: Components of Organizational Cyber Security Management

20. Organizational Cyber Security Management
The ability to recognize, plan, and implement organizational cyber security defenses.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand support architectures, policies, practices, and procedures that enable the organizations to manage threats, including anti-malware software related to organizational data/devices/systems. They have knowledge about proper handling, usage, and storage of an organization's IT assets to limit potential business or legal risks and are able to develop and implement their own digital resiliency plans.	**14, 25**
Skills	Individuals develop cognitive and technical skills for improving their organization's cyber security systems, which impact the operation and profitability of the business. They forecast and assess existing and potential security risks, and develop and implement intervention strategies to proactively protect and optimize an organization's IT assets in alignment with internal policies and processes on relevant legislation and business strategies. They further enable the prompt recovery of critical IT infrastructure and systems following a crisis or disaster. They develop and disseminate corporate security policies, frameworks, and guidelines to ensure that day-to-day business operations guard or are well protected against risks, threats, and vulnerabilities.	**14, 25**
Attitudes and Values	Individuals value cyber security and proactively advocate it in their organization by providing advice and guidance on potential risks, mitigation strategies, and best practices. This includes development of communication strategies for organizations and communities to ensure adoption and adherence to security policies and standards that enable viable secure conditions for work and living.	**25**

* An index of the frameworks listed in this column can be found in Appendix 1

Table 24: Components of Relationship Management

21. Relationship Management
The ability to skillfully manage one's online relationships through cooperation, conflict management, and persuasion.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand and manage different contexts of social interaction in online communities to achieve mutual consensus and outcomes. They understand how different behavioral norms and emotional reactions may vary depending on the platform and context.	4, 17, 18, 25
Skills	Individuals develop interpersonal skills that enable them to engage effectively and communicate and negotiate with and influence stakeholders in an intercultural online dialogue. They manage, maintain, and grow relationships with a specific group based on individual or organizational needs (e.g., in-depth customer engagement, relationship-building and provision of quality solutions and service to address customer needs). They build cooperative partnerships with inter-organizational and external stakeholders and leverage relations to meet organizational objectives. They can also manage various expectations and needs by building rapport, planning of actions to effectively communicate with, and negotiating with and influencing stakeholders.	17, 18, 21, 25
Attitudes and Values	Individuals exhibit self-motivation and a commitment to provide an inclusive culture that cultivates tolerance to one another and teamwork towards building and growing positive communities online. They are committed to exceeding both internal and external stakeholders' needs by demonstrating diplomacy, and a willingness to identify others' needs first and to consider a diverse set of opinions before making sound decisions.	17, 18, 21, 25

* An index of the frameworks listed in this column can be found in Appendix 1

Table 25: Components of Public and Mass Communication

22. Public and Mass Communication
The ability to communicate with an online audience effectively to exchange messages, ideas, and opinions reflecting wider business or societal discourses.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the importance of community engagement and civic participation that meet the quality expectations and standards that are aligned with the individuals' and/or organizational values and business objectives and the well-being of their local, national, and global communities.	**5, 13, 17, 18, 25**
Skills	Individuals are able to organize and rally a group online or know how to participate in an organized online group for effecting change that they aim to create. In doing so, they are better equipped to engage with individuals or groups through various digital media, to develop and review procedures, to participate in synchronous and asynchronous discussions, to create shared values, and to positively influence their communities through appropriate technologies.	**5, 13, 17, 18, 25**
Attitudes and Values	Individuals exhibit a belief in and respect for civic engagement and are willing to become involved in their communities for the betterment of their own organizations and/or society.	**18, 17**

* An index of the frameworks listed in this column can be found in Appendix 1

23. Data and AI Literacy

The ability to generate, process, analyze, present meaningful information from data and develop, use, and apply artificial intelligence (AI) and related algorithmic tools and strategies in order to guide informed, optimized, and contextually relevant decision-making processes.

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand the theory of data analysis, statistics, and AI-related mathematical concepts and computer programming. They understand how data are generated, to process data based on statistical understanding, and to create and/or use AI algorithms (e.g., machine learning, neural networks, deep learning) to recognise significant patterns and to improve decision-making processes. They understand concepts across multiple disciplines and identify the benefits, limits, and risks brought about through big data, AI, and related technology.	**1, 13, 25**
Skills	Individuals develop efficient and stable processes to collect, store, extract, transform, load, and integrate data at various stages in the data pipeline. They read, manage, analyze, and process data from a variety of sources, and prepare data in a structure that is easily accessed and analyzed according to specific requirements. They create and build knowledge by analyzing data, communicate its meaning to others with various data visualization tools (e.g., infographics, dynamic, illustrative, and interactive graphics), and present patterns, trends, analytical insights from data or new concepts in a strategic manner for the intended audience. In turn, they communicate the limitations of data by telling when data is being manipulated to support a limited or false narrative.

With understanding of AI, they develop, select, and apply relevant algorithms and advanced computational methods to enable systems or software agents to learn, improve, adapt, and produce desired outcomes or tasks. They use it as a tool to enhance efficiency in creative processes, and develop strategies on how they utilise it in optimizing their own work performance (e.g., predictive behavior analytics, pattern recognition, and decision-making processes).

They understand how data and AI may affect one's perception and reasoning. Individuals are also able to leverage AI to augment their own intelligence while remaining aware of how human value judgements play into the applications of big data and AI in society. | **1, 13, 25** |
| **Attitudes and Values** | Individuals are confident in pursuing innovative and analytical careers. They are also proactive in applying their knowledge of data and AI into evaluating whether broader systems are acting in ways aligned with community values that promote well-being. | **12** |

* An index of the frameworks listed in this column can be found in Appendix 1

Table 27: Components of Participatory Rights Management

24. Participatory Rights Management
The ability to understand and exercise one's powers and right to online participation (e.g., their rights to personal data protection, freedom of expression, or to be forgotten).

Taxonomy	Definition	Related Existing Frameworks*
Knowledge	Individuals understand their rights as digital citizens and consumers (e.g., their rights to personal data protection, freedom of expression, or to be forgotten), and why risks and opportunities for online participation are unevenly distributed across social groups (e.g., due to differences in socioeconomic status, (dis)ability, physical location).	1, 18, 21, 24
Skills	Individuals become equipped to develop cognitive and meta-cognitive skills for synthesizing existing legislation with their own practices to ensure that digital rights are upheld and respected online; they also develop complex system-level thinking for upholding individual and community rights to online participation as they monitor and improve systems and hold contradictory ideas and ideals in tension.	1, 13, 18, 21, 24
Attitudes and Values	Individuals exhibit proactive thinking, grounded in respect for democratic ideals, the rule of law, human rights. They take responsibility for managing technology to promote the public good of society and the environment.	1, 8, 10, 16, 18

* An index of the frameworks listed in this column can be found in Appendix 1

Connection with Future-Readiness

The OECD Education 2030 Framework has identified three categories of competencies that empower individuals to transform their societies and shape their futures. These three "Transformative Competencies" are (1) creating new value, (2) reconciling tensions and dilemmas, and (3) taking responsibility.[11] These intra-connected competencies connect with other future-readiness competencies, which have been identified by other organizations. These include "trending skills" that the WEF predicted, in their Future of Jobs 2018 Report, to be important for the workforce by 2022. Such skills include the following: Analytical thinking and innovation, Active learning and learning strategies, Creativity, originality and initiative, Technology design and programming, Critical thinking and analysis, Complex problem-solving, Leadership and social influence, Emotional intelligence, Reasoning, problem-solving and ideation, and Systems analysis and evaluation.

This section provides examples of how each of the 24 DQ competencies can help develop the "trending skills" identified in the WEF Future of Jobs 2018 Report and, in turn, how they can enhance the OECD's Transformative Competencies.

Table 28: Relationship between DQ Competencies and Future-Readiness

*Note: Top 10 Skills in-demand as of 2018, as listed in WEF's Future of Jobs 2018 Report

First-Order Transformative Competencies and Future-Ready Skills Developed

Second-Order Transformative Competencies and Future-Ready Skills Developed
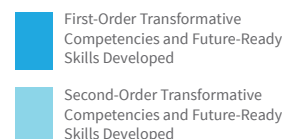
Creating New Value

Analytical thinking and innovation

As is clear from the Digital Literacy competencies outlined above, individuals who develop and practice the knowledge, skills, attitudes, and values of Media and Information Literacy, Content Creation and Computational Literacy, and Data and Financial Literacy will be attentive to and critical of data, information, content, and technology production and actively craft new and innovative approaches.

Active learning and learning strategies

Active learning is embedded in competencies identified as Digital Identity, including the ability to learn while recognizing oneself as a life-long learner. For example, as individuals come to be identified as "Digital Changemakers," curiosity about emerging trends within technological environments will drive awareness of existing gaps in their digital competencies and motivate efforts toward self-improvement. Moreover, individuals who identify as Digital Co-Creators will be able to develop efficient learning strategies, display an awareness of common and relevant technologies, and decide on which might best serve their purposes and needs.

Creativity, originality, and initiative

The concepts of creativity and originality have been tightly interwoven within conceptualizations of Digital Intelligence through its second level, Digital Creativity. This second level of DQ is guided by the principle of using digital technologies to resolve global challenges to achieve individual and societal well-being. Individuals who are fluent in these competencies, for example, consciously practice and develop originality of thought and a willingness to address larger community and societal challenges.

Technology design and programming

As described in the Content Creation and Computational Literacy and Intellectual Property Rights Management sections, individuals become equipped with the skills to design, develop, and adapt knowledge, content, and technology, and with characteristics, such as active learning, through their willingness to engage with evolving and advancing digital technologies.

Complex Problem Solving

As "Digital Citizens", individuals become better able to understand the nuances of key debates, such as issues around data privacy, surveillance, and fake news. By understanding how technology shapes and is shaped by a wide array of factors, individuals will develop complex problem-solving skills, extending their thinking and integrating digital networks and tools to develop solutions to address socioeconomic issues.

Systems analysis and evaluation

The capacity for systems analysis and evaluation has similarly been imbued in the third level of DQ, Digital Competitiveness. Guided by the principles of innovation for the improvement of humanity, individuals fluent in these eight areas will be able to apply their critical thinking skills to understand the complexity of systems, such as how technology can contribute to the levelling of inequality. In developing these macro-level perspectives, individuals can come to understand how complex systems and institutions work together in the creation and maintenance of our digital landscapes.

Emotional intelligence

Digital Emotional Intelligence forms one of the eight areas of Digital Intelligence. For individuals familiar with the competencies of Digital Empathy, Self-Awareness and Management, and Relationship Management, the building and development of one's socio-emotional capacities and ability to think reflexively undergirds all of their experiences.

Taking Responsibility

Critical thinking and analysis

The development of one's capacity for critical thinking is a core ability underlying "Digital Citizenship." Equipped with skills in Media and Information Literacy that are crucial for an age of information cascades, individuals develop their critical and analytical thinking to articulate information and content needs while simultaneously being cognizant of the dangers of disinformation and misinformation. Developed and honed through the first level of digital intelligence as part of "digital citizenship," this capacity to discern enables individuals to independently manage their safety and security needs online.

Leadership and social influence

Captured in the very first competency—Digital Identity—digital citizens are co-creators of technology, entrepreneurs, and changemakers; they not only understand their own participation online, but they are also familiar with the inherently social and interconnected nature of the Internet. Expanded upon in the competencies identified under Digital Communication, this knowledge of the Internet empowers digital citizens with practical skills, such as understanding which methods are most effective for communication, and with socio-emotional and leadership skills developed through active collaboration to achieve specified goals.

Reasoning, problem solving and ideation

As Digital Co-Creators, individuals seamlessly but intentionally integrate digital technologies into their everyday lives. With this intention, they will be able to build higher-order thinking and reasoning skills that aid in their capacity to explore their identity both online and offline, to understand their contributions in a wider perspective, and to connect with others.

Coordination and time management

Active collaboration—identified and highlighted as Online Communication and Collaboration—not only enables individuals to develop key leadership skills but also skills in project coordination and management. Starting with screen time management, identified in the Balanced Use of Technology section, such productivity skills are enhanced by one's identification as a Digital Changemaker, where the development of project management skills, such as time management and resource delegation, thoroughly aids in the conceptualization and follow-through of group-based projects.

Contribution to Well-Being, Sustainable Development Goals, and Human Rights

The ultimate goal of the DQ Framework is to guide digital practices towards achieving individual and societal well-being across all aspects of one's life.

The OECD's Better Life Initiative identified the following 11 areas of well-being (Figure 8): income, wealth, jobs, earnings, housing, quality of life, including health, civic engagement, social connections, education, security, life satisfaction, and the environment. These 11 areas of well-being, in turn, contribute to achieving the 17 UN Sustainable Development Goals (UN SDGs)(Figure 9).

The UN SDGs focus on 17 societal dimensions, including ending poverty and promoting prosperity, well-being, and protection of the planet.

With the goal of advancing the UN SDGs, we adopted the OECD's 11 indicators of well-being as a guide for pinpointing areas where interventions can be made to equip individuals with digital intelligence.

Figure 8: 11 OECD Well-Being Indicators.

Source: OECD Better Life Initiative.
http://www.oecd.org/statistics/better-life-initiative.htm

Figure 9: 17 U.N. Sustainable Development Goals

Source: Sustainable Development Goals, United Nations.
https://www.un.org/sustainabledevelopment/sustainable-development-goals/

Table 29: Relationship between the DQ competencies, the OECD Well-Being Indicators and UN SDGs

OECD Well-Being Indicators	Digital Intelligence (DQ) Competencies	Sustainable Development Goals
Income	Ending poverty around the world through the use and application of technology with digital intelligence.	**1 NO POVERTY**
	Ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture through the use of technology with digital intelligence.	**2 ZERO HUNGER**
Health	Ensuring healthy living and promoting well-being in one's use of technology with digital intelligence.	**3 GOOD HEALTH AND WELL-BEING**
	Achieving gender equality by empowering all women and girls to confidently and competently use technology and digital intelligence.	**5 GENDER EQUALITY**
Education	Ensuring inclusive and equal-quality digital intelligence education and promoting lifelong learning opportunities that adapt to an everchanging digital landscape.	**4 QUALITY EDUCATION**
Housing	Promoting technological innovations through digital intelligence to address and ensure the availability of sustainable water and sanitation management for all.	**6 CLEAN WATER AND SANITATION**
Environment	Using technology with digital intelligence to ensure access to affordable, reliable, and sustainable energy for all.	**7 AFFORDABLE AND CLEAN ENERGY**
Jobs	Contributing to sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work by digital skilling for all.	**8 DECENT WORK AND ECONOMIC GROWTH**
	Building resilient digital infrastructure, and promoting inclusive and sustainable industrialization and innovation by fostering cyber security and safety skills among citizens through digital intelligence.	**9 INDUSTRY, INNOVATION AND INFRASTRUCTURE**
Life Satisfaction	Reducing inequality within and among countries by supporting initiatives that address digital divides in access, skills, and infrastructure, and by providing affirmative action for those already vulnerable communities.	**10 REDUCED INEQUALITIES**
Civic Engagement	Ensuring sustainable consumption and production patterns by using technology with digital intelligence to bring about equitable, just, and sustainable global supply chains.	**12 RESPONSIBLE CONSUMPTION AND PRODUCTION**

Category	Description	Goal
Environment	Applying digital intelligence to make cities and human settlements safer, more inclusive, and more resilient through the use of clean and sustainable technology.	**11** SUSTAINABLE CITIES AND COMMUNITIES
	Guiding one's use of technology with digital intelligence to take urgent action to combat climate change and its impacts.	**13** CLIMATE ACTION
	Using technology with digital intelligence to conserve and sustainably use oceans, seas, and marine resources for sustainable development.	**14** LIFE BELOW WATER
	Using technology with digital intelligence to protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and biodiversity loss.	**15** LIFE ON LAND
Safety	Promoting peaceful and inclusive societies for sustainable development, providing access to justice for all, and building effective, accountable, and inclusive institutions at all levels by empowering communities with digital intelligence to mitigate evolving cyber-risks and threats.	**16** PEACE, JUSTICE AND STRONG INSTITUTIONS
Community	Strengthening technology by implementing digital intelligence and revitalizing global partnerships for sustainable development.	**17** PARTNERSHIPS FOR THE GOALS

Sustainable Development Impact Summit 2018
New York, 24-25 September

DQ as Global Standards for Digital Literacy, Skills, and Readiness

Coalition for Digital Intelligence (CDI)

The Coalition for Digital Intelligence (CDI) is a cross-sector cooperative network of organizations from around the world that aims to improve global digital intelligence by coordinating efforts across educational and technology communities through multi-stakeholder collaborations. It was formed by the Organization for Economic Cooperation and Development (OECD), the IEEE Standards Association, and the DQ Institute in association with World Economic Forum and launched on September 26, 2018.

The Coalition aims to set a global framework for digital intelligence, which includes a common set of definitions, language, and understanding of comprehensive digital literacy, skills, and readiness that can be adopted by all stakeholders worldwide, including national governments, educators, technology companies, and service providers.

A common framework endorsed by key institutions and standard-setting bodies would be highly beneficial for all stakeholders, in both educational and technology communities, by enabling stakeholders to work synergistically rather than discretely to address similar sets of problems and by allowing the coordination of efforts both within and across sectors.

Figure 10: The Coalition for Digital Intelligence brings together organizations from across sectors to enhance Digital Literacy and Skills.

Industry Perspective: IEEE's Standardization of DQ as Industry Standards for Digital Skills

As a key stakeholder and standards developer in the technology community, the IEEE recognized that the need to foster digital competencies and improve societal well-being, had yet to be ingrained within the industry as a whole. While it was not initially sure whether such goals would be achieved through

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technological development or through existing public product skills training, IEEE saw that the development of a comprehensive digital competency standard, in addition to technical product guides, was necessary.

Alongside these concerns was the observation that various organizations and entities were already addressing digital upskilling, either by creating their own frameworks or by leveraging other frameworks. Nevertheless, by and large, these frameworks lacked a common set of indicators for more comprehensively and collectively understanding the existing challenges that digital skill-promoting efforts face. A common language was seen to be crucial to ensure that digital literacy and competency efforts are coordinated globally and moving in the right direction.

The IEEE's participation in the CDI thus grew out of efforts to address these needs. In December 2017, the IEEE Digital Literacy Industry Connections Group conducted a literature review of over 100 different literacy and skill-building resources to develop a set of collectively shared definitions of digital competencies. From this in-depth review, IEEE recognized the comprehensive and adaptive nature of the DQ Framework, noting the breadth and depth of the Digital Intelligence umbrella. IEEE then decided to institutionalize the DQ Framework as a global standard in digital skill development and is taking additional steps to support the DQ Framework and its adoption by industry leaders, governments, and civil society organizations.

"The development of Digital Intelligence is not ad hoc. It should be a paradigm with a focus on technical excellence and deployment though collaboration of many forms around the world. We see the opportunity to enable the build of Digital Intelligence into product and software design from the onset through the use of global standards that include agreed upon common definitions and take into account various contexts. It will also enable improved practices and processes towards the development of indicators and measurement." - Melissa Sassi, Chair of Digital Literacy & Skills Working Group: IEEE Smart Village

Educational Perspective: Alignment with the OECD Education 2030 for Digital Literacy

A similar move to address the digital literacy gap in public education systems has been a key priority for national ministries. As part of efforts to identify and foster students' future-ready competencies, the OECD has developed a future-learning framework, entitled the OECD Education 2030 Framework, to serve as a learning compass for shaping future education paradigms and systems.

Embedded in the initiative is the recognition that digitization is making the world more complex and that individuals living in such a digital world must reconcile its contradictory tendencies—for example, the amplification of some voices and not others or the tension between an increasingly interconnected and knowable world and the rise of a "post-truth" culture built on the dissemination of misinformation. Addressing these tensions requires a digital intelligence rooted in human capabilities—a deep understanding of the digital world to make sense of the noise of online content.

The growing complexity of modern living calls for a deep understanding that integrates information, concepts, ideas, practical skills, and intuitions in a productive synthesis for real-life applications. In a structurally imbalanced world, reconciling diverse perspectives and interests requires people to become adept at handling tensions and dilemmas, striking a balance between competing demands such as equity and freedom, autonomy and community, or innovation and continuity. People will need to think in integrated ways that recognize those interconnections, to deal with novelty, change, diversity, and ambiguity. The underlying premise is the assumption of independent thought and a willingness for collaboration: the ability to reflect on one's ethics in light of one's actions. Central to this reflexivity is the concept of self-regulation, which necessarily entails self-control, self-efficacy, responsibility, problem solving, and adaptability—all features that make digital intelligence crucial for education and future readiness.

"In a world where the kinds of things that are easy to teach and test have also become easy to digitize and automate, we need to work harder to pair the artificial intelligence of computers with the human capabilities that will empower individuals to fully capitalize on new technologies. This makes the Coalition for Digital Intelligence so important and the OECD is privileged to contribute, through its Education 2030 Learning Framework, a common language and methodology to this work," - Andreas Schleicher, Director for Education and Skills, and Special Advisor on Education Policy to the OECD Secretary-General

Institutionalization and Adoption of the DQ Framework

The institutionalization and adoption of the DQ Framework with a broad consensus will be accomplished by synchronous movements within the CDI.

The DQ Institute will continuously update the DQ Framework as needed.

The IEEE Standards Association started its official standardization of the DQ Framework and will coordinate with a multi-stakeholder coalition of companies and organizations that will promote and implement the IEEE-sanctioned DQ standards.

The IEEE Standards Association will work with key stakeholders, experts, and users to develop the DQ Framework as a technical standard to support technological innovation and design.

The OECD will collaborate with the DQ Institute to develop a digital literacy structure using its Education 2030 Learning Framework and to engage the global education community, including governments, academic experts, teachers, foundations, parents, and students.

The World Economic Forum will advance global coordination while promoting multi-stakeholder collaborations.

The CDI will also develop a common reporting framework for each group and hold summits to bring various stakeholders together to share progress updates and to identify needs that each community may have in relation to one another.

These results will be looped back into the DQ Framework, which will be regularly updated in response to feedback from practitioners and ongoing technological advances.

Benefits of Global Standards

1 Common Understanding, Structure, and Taxonomy as a Point of Reference

The goal of institutionalizing the DQ Framework as a global standard is the development of a common understanding, structure, and taxonomy for digital literacy, skills, and readiness. This institutionalization will enable individuals, organizations, national ministries, and technology developers to communicate effectively and systematically in formulating essential digital competencies.

In formalizing terms such as "privacy management" or "digital footprint management" as a DQ competency, the DQ Framework aims to expand the conversation around digital competencies so that industry developers, curriculum developers, and educational policymakers can collaborate, not only with one another but also with technology practitioners. In the discursive space that emerges from such collaborations, communities will be able to address the gap between rapidly advancing technology and adapting timely educational policies, while ensuring that those at the forefront of innovating digital technology continuously anticipate the uses and consequences of their work.

By enhancing efficiency in the framing and transmitting of the DQ framework across its various stakeholders, the coordination, practices, and distribution of digital competencies will be improved across all corners of the globe.

2 Quality Assurance of Digital Intelligence Education, Training, and Assessment

Coordination of digital intelligence education, training, and assessment is significant across public education curricula development as well as across the educational and training programs that private organizations develop. Enhanced by its breadth and depth, the adoption and utilization of a common DQ Framework will provide quality assurance for initiatives driven by both sets of actors.

With regard to national ministries, a common framework can identify and examine the extent to which digital intelligence competencies are present in existing curricula. The results of this kind of evaluation are crucial for national ministries to address gaps in their curriculum and to allow for international benchmarking that facilitates knowledge sharing of educational best practices.

For private sector education and training programs, implementing the DQ Framework as a key guide for upskilling initiatives can similarly ensure that skill-building efforts are not limited to specific topics or products, and rather can be aligned with a comprehensive set of global standards.

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Appendix 1: Existing Frameworks Included in the DQ Framework

We identified 25 frameworks from different nations and organizations that have been created and published, and present their own digital literacy, digital skills and/or 21st century skills frameworks.

From the public sector, a number of initiatives spearheaded by national governments have created frameworks for developing and integrating public programs that foster digital citizenship for citizens. Examples include the UK Council of Child Internet Safety's (UKCCIS) Education for a Connected World, British Columbia's Digital Literacy Framework, while international and regional frameworks include those created by the European Commission and The United Nations Educational, Scientific and Cultural Organization (UNESCO). Frameworks created by not-for-profit organizations were also reviewed as part of this paper. Key examples include the Mozilla Foundation's Web literacy map, the International Society for Technology in Education's (ISTE) Standards for Students, Common Sense Media's K-12 Digital Citizenship Curriculum Framework, and MediaSmart's Classroom Guide for integrating digital literacy into pedagogical practice. Finally, we also reviewed frameworks and curricula created by private sector organizations, such as Microsoft's Digital Literacy curriculum.

The full list of frameworks can be found in Table 30 below.

Table 30: Frameworks reviewed while creating the DQ Framework.

#	Country	Organization	Name	Year of Publication	Source
1	Australia	Australian Curriculum Assessment and Reporting Authority (ACARA)	The Australian Curriculum v8.3	2015	http://www.australiancurriculum.edu.au/technologies/digital-technologies/curriculum/f-10
2	Canada	Government of British Columbia	Digital Literacy	2016	https://www2.gov.bc.ca/gov/content/education-training/k-12/teach/teaching-tools/digital-literacy
3	United States of America	Common Sense Media	K-12 Digital Citizenship Curriculum Scope and Sequence	2015	https://www.commonsense.org/education/scope-and-sequence
4	Europe	European Commission Joint Research Centre	DigComp 2.0, 2.1: European Digital Competence Framework for Citizens	2016, 2017	https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework http://publications.jrc.ec.europa.eu/repository/bitstream/JRC106281/web-digcomp2.1pdf_(online).pdf
5	United States of America	International Society for Technology in Education	ISTE Standards for Students	2016	https://www.iste.org/standards/for-students
6	Switzerland	International Telecommunications Union	Manual for Measuring IT Access and Use by Households and Individuals	2014	https://www.itu.int/en/ITU-D/Statistics/Pages/publications/manual2014.aspx

7	United Kingdom	Jisc	Building Digital Capabilities: The Six Elements Defined	2017	http://repository.jisc.ac.uk/6611/1/JFL0066F_DIGIGAP_MOD_IND_FRAME.PDF
8	UK	UNICEF/LSE	Global Kids Online	2018	http://globalkidsonline.net/
9	United States of America	Massachusetts Department of Elementary and Secondary Education	2016 Massachusetts Digital Literacy and Computer Science (DLCS)	2016	http://www.doe.mass.edu/frameworks/dlcs.pdf
10	Canada	MediaSmarts	Classroom Guide—Integrating Digital Literacy into your Classroom Practice	2018	https://mediasmarts.ca/sites/mediasmarts/files/guides/classroom_guide_digital_literacy.pdf
11	United States of America	Microsoft	Digital Literacy Standard Curriculum Version 4	2014	https://www.microsoft.com/en-gb/digitalliteracy/curriculum4.aspx
12	Singapore	Ministry of Education (Singapore)	Cyber Wellness 101	2018	https://ictconnection.moe.edu.sg/cyber-wellness/cyber-wellness-101
13	United States of America	Mozilla	Web Literacy	2016	https://learning.mozilla.org/en-US/web-literacy
14	United States of America	National Institute of Standards and Technology	Framework for Improving Critical Infrastructure Cybersecurity	2018	https://nvlpubs.nist.gov/nistpubs/CSWP/NIST.CSWP.04162018.pdf
15	Netherlands	International Association for the Evaluation of Educational Achievement (IEA)	International Computer and Information Literacy Study	2013	https://www.acer.org/files/ICILS_2013_Framework.pdf
16	United States of America	North Central Regional Educational Laboratory & Metiri Group	enGauge 21st Century Skills: Literacy in the Digital Age	2003	http://www.cwasd.k12.wi.us/highschl/newsfile1062_1.pdf
17	United States of America	Battelle for Kids Partnership for 21st Century Learning	Frameworks and Resources	2019	http://www.battelleforkids.org/networks/p21/frameworks-resources
18	Europe	European Commission Joint Research Centre	EntreComp: The Entrepreneurship Competence Framework.	2016	http://publications.jrc.ec.europa.eu/repository/bitstream/JRC101581/lf-na27939enn.pdf
19	United Kingdom	The Open University	Digital and Information Literacy Framework	2012	https://www.open.ac.uk/libraryservices/pages/dilframework/index

20	United Kingdom	The UK Council for Child Internet Safety (UKCCIS)	Education for a Connected World: a framework to equip children and young people for digital life	2018	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/683895/Education_for_a_connected_world_PDF.PDF
21	France	The United Nations Educational, Scientific and Cultural Organization (UNESCO)	Global Media and Information Literacy Assessment Framework: Country Readiness and Competencies	2013	http://unesdoc.unesco.org/images/0022/002246/224655e.pdf
22	Brussels	ThinkYoung	Digital Resilience	2015	https://www.thinkyoung.eu/digitalcitizenship
23	France	OECD	OECD Skills Study, OECD Programme for the International Assessment of Adult Competencies (PIAAC).	2016	http://www.oecd.org/skills/skills-matter-9789264258051-en.htm
24	Bangkok	The United Nations Educational, Scientific and Cultural Organization (UNESCO)	Digital Citizenship Competency Framework, Digital Kids Asia Pacific	2018	https://bangkok.unesco.org/content/safe-effective-and-responsible-use-ict
25	Singapore	SkillsFuture	Skills Framework for Infocomm Technology	2019	http://www.skillsfuture.sg/skills-framework/ict#whoisit-for

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The DQ Institute

DQ Institute (DQI) is an international think-tank that is dedicated to setting global standards for digital intelligence education, outreach, and policies. Working together with international agencies and local partners, DQI builds multi-stakeholder coalitions that advance its mission and help people worldwide. DQI's award-winning educational programs include the #DQEveryChild initiative, which seeks to empower 1 billion children with digital intelligence education.

For more information please visit:
https://www.dqinstitute.org/

The Coalition for Digital Intelligence

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For more information please visit:
https://www.coalitionfordigitalintelligence.org/