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IEEE Standard for Digital Intelligence (DQ)—Framework for Digital Literacy, Skills, and Readiness

STANDARDS

IEEE Computer Society

Developed by the
Learning Technology Standards Committee

IEEE Std 3527.1™-2020

IEEE

IEEE Standard for Digital Intelligence (DQ)—Framework for Digital Literacy, Skills, and Readiness

Developed by the

Learning Technology Standards Committee
of the
IEEE Computer Society

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IEEE SA Standards Board

Abstract: In today's digital age, technology has a firm grasp on practically every aspect of human life, consequently there is growing cross-sector demand to help individuals build digital competencies such as digital literacy, digital skills, and digital readiness. However, there is no universally accepted meaning of terms like "digital literacy," "digital skills," or "digital readiness," which can lead to difficulty coordinating efforts to improve digital competencies worldwide.

Digital Intelligence (DQ) was developed to encompass a comprehensive set of technical, cognitive, meta-cognitive, and socio-emotional competencies, which are grounded in universal moral values and enable individuals to face the challenges of digital life and adapt to its demands. The DQ Framework is comprised of 8 areas of digital life—identity, use, safety, security, emotional intelligence, literacy, communication, and rights—across 3 levels of experience—citizenship, creativity, and competitiveness.

The objective of this standard is to establish a DQ global standard that encompasses a common framework to ensure that digital competency building efforts are coordinated globally. It includes a common set of definitions, language, and understanding of digital literacy, skills, and readiness that can be adopted by all stakeholders worldwide, including national governments, the educational industry, the technology industry, international agencies, private companies, and society as a whole.

Keywords: community development, cyber-health, cyber-risk, digital citizenship, digital competency, digital intelligence, digital literacy, digital readiness, digital skills, IEEE 3527.1™, future-readiness, future skills, human capital development, skills development, technology design, technology education

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

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Yuhyun Park, *Chair*

Organization Represented	*Name of Representative*
Singapore Telecommunications Ltd.	Chia Boon Chong
SkillsFuture Singapore Agency	Michael Fung
Turkcell İletişim Hizmetleri A.Ş	Feyza User

The following members of the entity Standards Association balloting group voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

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Introduction

This introduction is not part of IEEE Std 3527.1-2020, IEEE Standard for Digital Intelligence (DQ)—Framework 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 [B20], the World Economic Forum (WEF) [B33], the World Bank [B30], and the United Nations [B30] 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 [B6]. 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 proactively mitigate various cyber-risks, while maximizing the potential of technology.

On the other hand, the WEF's 2018 Future of Jobs report [B33] 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" [B8].

In summary, the digital competencies shall 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 forms 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 toward 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, Organisation 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.

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 shall 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.

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IEEE Standard for Digital Intelligence (DQ)—Framework for Digital Literacy, Skills, and Readiness

1. Overview

1.1 Scope

Digital intelligence is a comprehensive set of technical, cognitive, meta-cognitive, and socio-emotional competencies that enable individuals to face the challenges of and harness the opportunities of digital life. The digital intelligence standard establishes a framework that encompasses digital literacy, skills, and readiness, comprising eight areas of digital life—identity, use, safety, security, emotional intelligence, literacy, communication, and rights—across three levels of experience—citizenship, creativity, and competitiveness.

1.2 Purpose

The purpose of this standard is to establish a global standard with a common framework to help ensure that digital literacy and competency efforts are coordinated globally. This standard represents a global framework for digital intelligence, which includes a common set of definitions, language, and understanding of digital literacy, skills, and readiness that can be adopted by all stakeholders worldwide, including national governments, education industry, technology industry, companies, and society as a whole.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).[1,2]

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

[1]The use of the word *must* is deprecated and cannot be used when stating mandatory requirements; *must* is used only to describe unavoidable situations.
[2]The use of *will* is deprecated and cannot be used when stating mandatory requirements; *will* is only used in statements of fact.