GLOBAL ALLIANCE FOR DIGITAL EDUCATION AND SUSTAINABILITY

(GADES)

A Digital & Artificial Intelligence Literacy Working Group

December 2024

ADVANCING DIGITAL EDUCATION & SUSTAINABILITY

TABLE OF CONTENTS

SAMIMX/PIXABAY

ABOUT THIS REPORT

GADES is a global community of knowledge and practice advancing digital education – awareness, capacity, and literacy around the design, development, and use of digital technologies, with consideration for social and environmental sustainability.

GADES is led by a coalition of partners: Future Earth Canada, Digital National Alliance Bulgaria, Sustainability in the Digital Age, National Central University Taiwan, Asian Institute of Technology, LabXR Pontifical Catholic University of Peru, Future Earth Taipei, MKAI International Ltd., Coalition for Digital Environmental Sustainability (CODES), Earth 3.0 Foundation, Silver Bolt, Open Channel Culture, and Kankan∗ Tree.

Since December 2023, the Alliance has held consultations that focus on identifying the key challenges and solutions around building awareness, capacity, and literacy on digital technologies and its impact on sustainability transformations. This report highlights the key findings of these conversations, held with over 80 stakeholders from more than 20 nations.
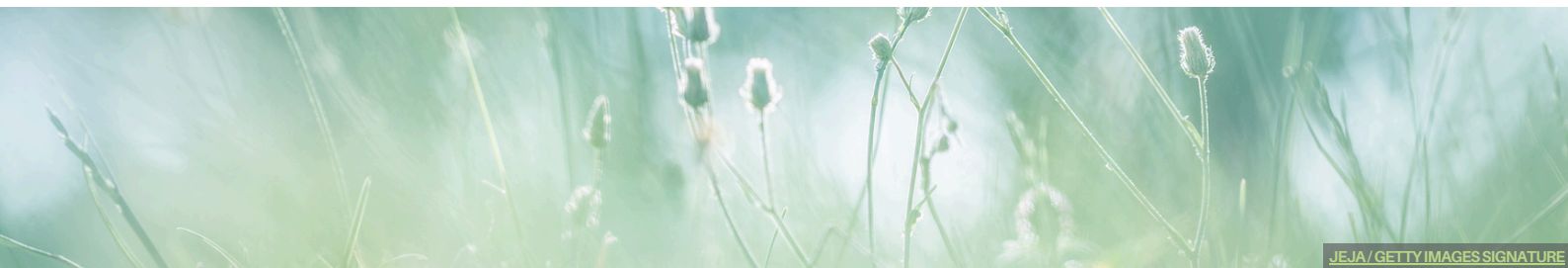
For an executive summary, visit this page.

Suggested citation:
The Global Alliance for Digital Education and Sustainability (GADES). Advancing Digital Education & Sustainability. GADES; 2022.

I. INTRODUCTION

1.1 The need for digital education and sustainability

In a 2023 consultation for the UN Global Digital Compact on "digital literacy", experts highlighted the need to better equip stakeholders with the capacity to critically reflect on digital technologies and to build architecture for digital cooperation (a type of 'radical collaboration') in order to ensure sustainable environmental, economic and social growth in this rapidly digitizing world (1).

In response to this urgent need, the Global Alliance for Digital Education and Sustainability (GADES) was formed to advance education, capacity and awareness for a sustainable digital planet.

Risks and Opportunities of the Digital Age:
Urgent action and systematic transformations across all sectors are crucial if the world is to achieve the SDGs and meet our climate goal of net zero by 2050 (2), and the ongoing digital transformation can help accelerate this needed action. For example, buildings now leverage Artificial Intelligence (AI) supported applications to automatically switch to cleaner energy sources whenever possible, reducing GHG emissions; remote sensing technologies are helping Indigenous Communities and other stakeholders protect lands and biodiversity by detecting and reporting illegal activities such as illegal logging and land grabs; and digital applications are rapidly increasing access to education and healthcare services (3).

However, without well-informed governance systems, digital technologies present many risks to society and the environment. For example, generative AI and digital platforms are accelerating the spread of misinformation, risking societal unrest (4). Facial recognition tools have been shown to not recognize or misidentify individuals with dark skin because of biases found in the training data (5). The rapid rate of digitalization is widening inequalities in places where access to digital tools and the internet remains limited (6). Digital technologies also present many known and unknown risks to our environment (7,8). Data centers needed to support large language models such as ChatGPT are highly water and energy intensive (9,10).

For example, data centers supporting GPT-4 in Iowa were reported to have consumed up to 6% of the district's water in the last month of training the AI model (11). Additionally, the increasing use of digital technologies is increasing levels of e-waste, with 2022 seeing approximately 62 billion kg of e-waste and only 22% reported as recycled (12), as well as increasing demand for rare earth metals and minerals such as cobalt, lithium, and more, which already have severe social and environmental implications (13) .

Education and awareness play a key role in our digital transformation. We need collaboration with diverse communities of practice including civil society, research and academia, technology and innovation, and policy to advance a new form of digital and AI literacy that also incorporates social and environmental sustainability principles. For example, transdisciplinary and interdisciplinary education and capacity building programs that bridge literacy around digital skills, digital transformations, and sustainability concepts are key to enabling this (14,15). This will also help us achieve digital sustainability - "the use of digital technologies to advance social and environmental sustainability in a safe, inclusive, and sustainable manner" (7). However, this remains a significant challenge, with digitalization and sustainability still misaligned (6), and digital literacy concepts limited to technical skills and competences, without considering the digital risks to society and environment [see Section 2].

CODES THREE SHIFTS FOR A SUSTAINABLE PLANET IN THE DIGITAL AGE

Align
digital advancement with sustainable development

Mitigate
the negative Impacts of the digital age

Accelerate
digital innovations for sustainability

Figure 1: CODES (Coalition for Digital Environmental Sustainability) identifies Three Shifts toward digital sustainability: **Align** the principles of digital transformation with sustainability; **Mitigate** the negative environmental and social impacts of digitalization, and **Accelerate** digital innovations for sustainability, to move towards a digital and sustainable planet (7).

1.2 The Global Alliance for Digital Education and Sustainability (GADES) - A Digital & Artificial Intelligence Literacy Working Group

GADES is a global community of knowledge and practice advancing digital education - awareness, capacity, and literacy around the design, development, and use of digital technologies, with consideration for social and environmental sustainability.

The Alliance has a membership of over 80 individuals from across the world, from a diverse range of disciplines, sectors, and fields. GADES is led by a coalition of partners: Future Earth Canada, Digital National Alliance Bulgaria, Sustainability in the Digital Age, National Central University Taiwan, Asian Institute of Technology, LabXR Pontifical Catholic University of Peru, Future Earth Taipei, MKAI International Ltd., Coalition for Digital Environmental Sustainability (CODES), Earth 3.0 Foundation, Silver Bolt, Open Channel Culture, and Kankan*Tree.

VISION

To reimagine and redefine global digital and AI literacy by including education around the ethical, safe, and sustainable design, development, and use of digital technologies. This means building a society able to develop, use, and engage with digital technologies safely, securely and inclusively, while understanding and mitigating the direct and indirect impacts they have on our society and environment.

MISSION

To bridge diverse stakeholders (including but not limited to technology experts, educators, sustainability researchers, policy makers, industry, and civil society), by defining common goals, consolidating best practices, and exploring innovative approaches to building digital education.

KEY ACTIVITIES

Identify challenges, solutions, and best practices in advancing digital education and sustainability, advise multi-level discussions and policy processes, foster partnerships to co-design and scale solutions, and advocate for and engage in transdisciplinary work.

OUR BENEFICIARIES

- Stakeholders who wish to develop innovative education and capacity building programs to address current needs in an increasingly digital world at the local, regional, global, and multigenerational levels.
- Stakeholders who wish to influence and design policy that addresses challenges related to sustainable development, digital transformations, ethical AI and technology, and education.
- Funders interested in education for digital environmental sustainability.
- ICT communities interested in designing socially and environmentally sustainable digital solutions.
- Policymakers and government agencies seeking evidence-based insights and recommendations to craft effective policies for a sustainable digital future.
- Researchers and academic communities exploring the impacts of digitalization on sustainability and seeking collaborative opportunities to advance this field of study.
- Youth who wish to learn with and contribute their experiences and insight on technology and education through multigenerational collaboration.
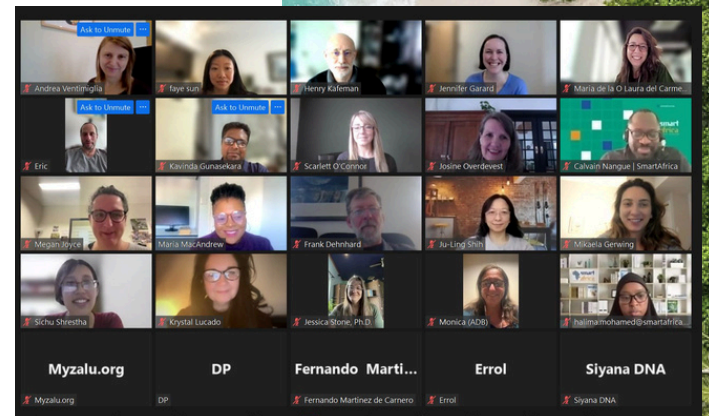
KEY DELIVERABLES - 2024 & 2025

Dec, 2023
GADES formed

April & June, 2024
Collective intelligence on key challenges

Sept, 2024
Key findings published, GADES promoted at Summit of the Future

Dec, 2024
Launch of GADES Report

2025 - 2026
Launch of pilot projects based on recommendations

2. DIGITAL LITERACY: CURRENT DEFINITIONS AND LIMITATIONS

CHRIS KIRBY / OCEAN IMAGE BANK

2.1 How is digital literacy currently defined?

Digital Literacy is a broad term that is defined in multiple ways depending on the context and use case. Given the difficulties of finding common understanding for concepts like Digital Literacy and Digital Competence, the Alliance has compiled an analysis of the limitations inherent with these terms. While the contents of this report refer to Digital Literacy and Digital Competency, we acknowledge the non-deterministic nature of these concepts and encourage members to actively contribute toward a shared understanding that better encapsulates the spirit of the GADES, by co-creating conceptual terminologies that might better embody our collective values and goals.

This section will compare and critique conceptualizations from three often cited sources: The European Commission (EC, European Union), the United States Agency for International Development (USAID, United States of America), and the Media Awareness Network (MNET, Canada).

I. European Commission's Framework of Digital Competence (DigiComp)

Competencies refer to the 1) Knowledge, 2) Skills, and 3) Attitudes that constitute the concept of Digital Literacy, and are meant to encourage the development of critical thinking, problem solving, teamwork, communication, creativity, negotiation, analytical and intercultural skills. The DigiComp framework is one of 8 Key Competences for Lifelong Learning proposed by the European Commission. This framework integrates both quantitative and qualitative methods for setting standards, monitoring, and measurement (16). Under DigiComp, there are 5 Digital Competencies:

- Information and data literacy
- Communication and collaboration
- Digital content creation
- Safety
- Problem solving (17)

II. USAID's definition of Digital Literacy

The USAID differentiates Digital Literacy from Digital Competence as two separate but related terms (Figure 2). USAID defines Digital Literacy as being composed of two main conceptual pillars: Capacity and Safety. Its main focus is on building a Digital Ecosystem that can support and empower Digital Literacy; it is therefore focused primarily on the systemic conditions for Digital Literacy and addressing the risks involved with increased use of digital technologies (18).

III. The Media Awareness Network (MNET)'s definition of Digital Literacy

The Media Awareness Network (MNET) follows a separate framework for Digital Literacy that extends beyond technological skills development and is focused more on understanding and content creation, with Access being foundational to all 3 active characteristics (Figure 3). While competencies are not discussed explicitly by MNET, they are implied as constitutive of Digital Literacy as a general concept, which makes use of the 3 active principles (19).
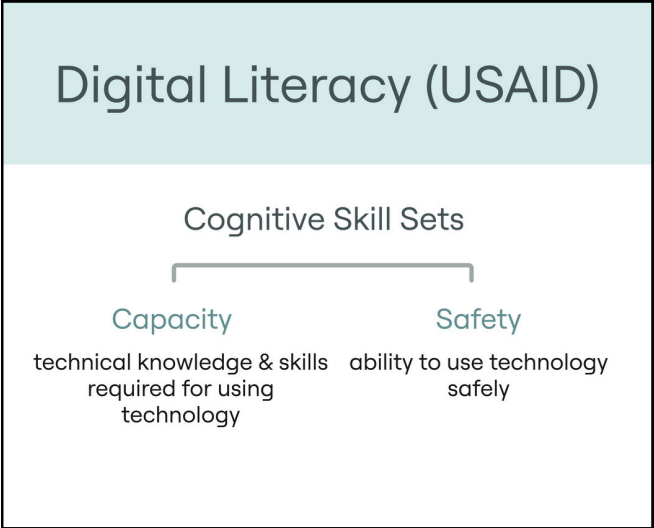
Digital Literacy (USAID)

Cognitive Skill Sets

Capacity
technical knowledge & skills required for using technology

Safety
ability to use technology safely

Figure 2: USAID breakdown of digital literacy

Digital Literacy (MNET)

Active Characteristics

Use ┄┄┄► **Understand** ┄┄┄► **Create**

Use: technical ability to use digital technologies and is skills-based

Understand: ability to comprehend, contextualize, & critically evaluate digital media

Create: ability to integrate digital skills & understanding toward content creation & communication
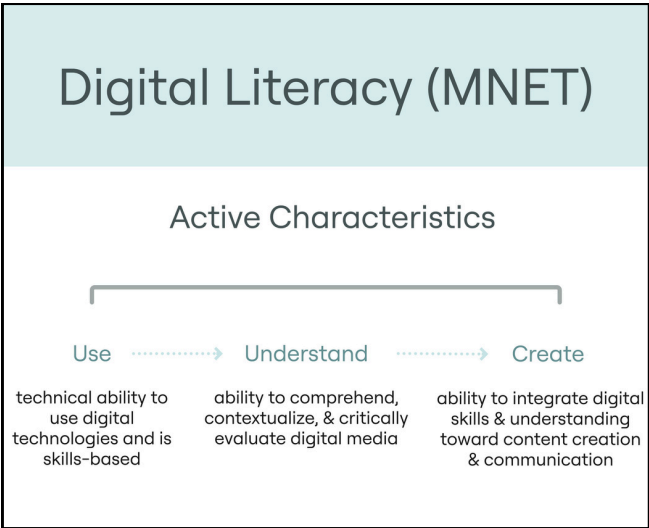
Figure 3: MNET's active characteristics for digital literacy

Figure 4: Overview of the differences in focus and scope for the European Commission, USAID, and MNET.

2.2 What is missing?

The comparisons above show that current definitions for Digital Literacy are varied and often lack consistency, making a shared understanding of the term elusive, which further complicates attempts at monitoring and measurement. Additionally, it is also argued that terms like "literacy" and "competency" contain inherent biases that may undermine their intended purpose.

Another concern is that there is an individualistic focus on technological skills rather than their application in different social contexts, the implication being that these skills should primarily be a means toward other ends, like citizenship, forming a more holistic understanding of Digital Literacy. Part of this also means acknowledging the socio-cultural contexts where certain skills, knowledge, and attitudes are developed and applied in order to identify the way that different contexts influence Digital Literacy (see Figure 5 for considerations on rethinking the terms literacy and competency). The key Issues with "Literacy" and "Competency" can be summarized into:

- Inconsistency of meaning & metrics (19–23)
- Access not clearly defined: financial, linguistic, conceptual, and disability (18,19,24)
- Individualistic focus on technological skills (21,25)
- Inherent [binaristic] biases (literate vs. illiterate, competent vs. incompetent) (20,22)
- Historical association with colonial logics of intelligence (20,22)

- Historical association with colonial logics of intelligence (20,22)
- Ignores social/cultural contexts where skills, knowledge, and attitudes are developed/applied (20,21,25)
- Lack of focus on marginalized/equity-deserving communities [5]
- Does not accurately represent its intended meaning and goals (22).

These issues further highlight the importance of fostering **trust** and **confidence** within frameworks for technological development, deployment, and use. Trust in the **efficacy and safety of digital tools** is necessary for their adoption and continued use and confidence in using digital tools is necessary for maximizing **user potential in building self-efficacy**(18)**.** Doing so may also bolster efforts toward **sustainability** in the development, deployment, and use of digital technologies as a result (26).

See Figure 5 for considerations on rethinking the terms literacy and competency.
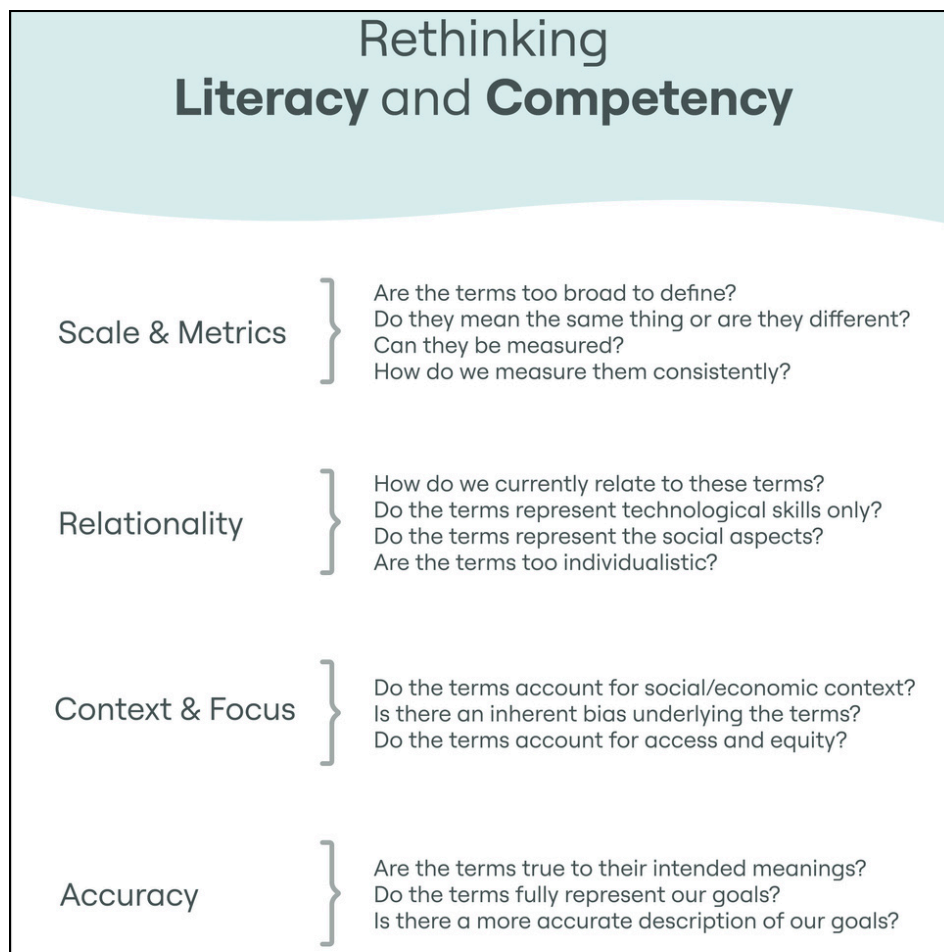
Figure 5: Considerations regarding the use of "literacy" and "competency"
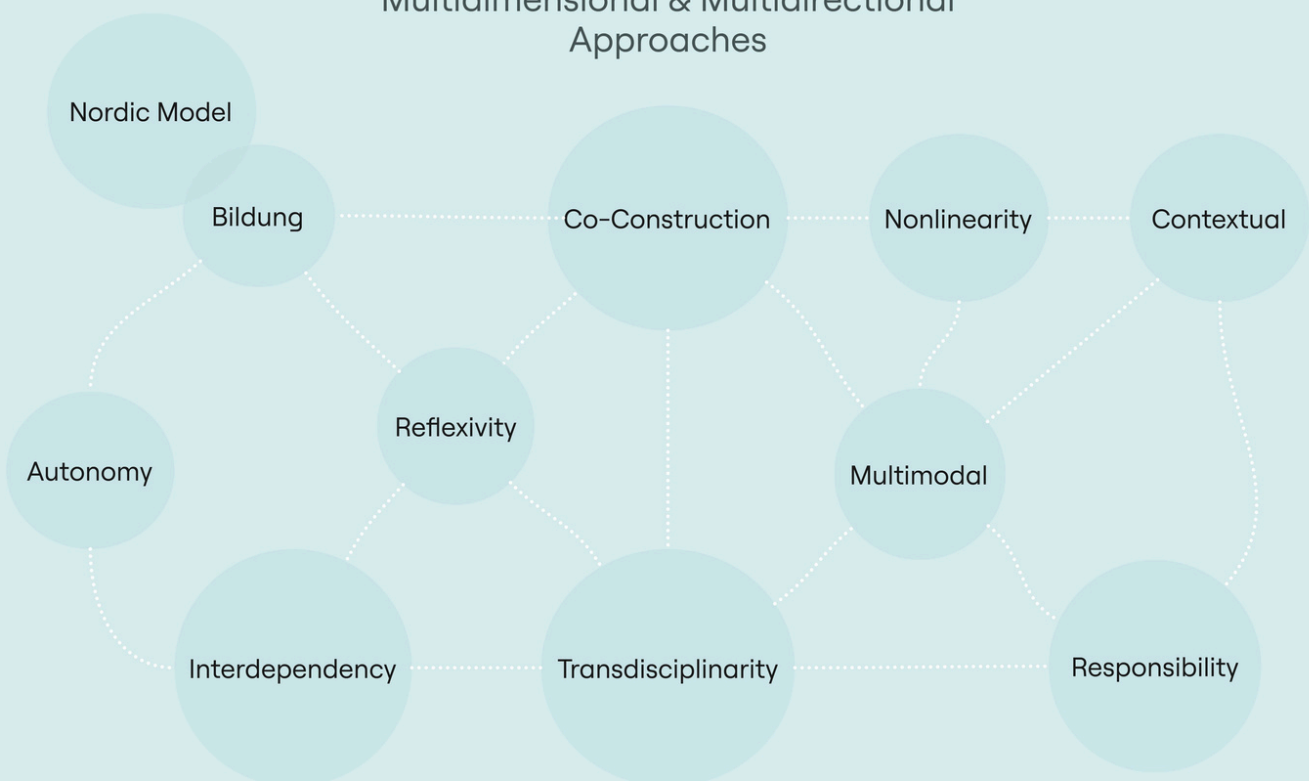
2.3 What can we do?

Some authors suggest that it is possible to address the challenges posed by Digital Literacy and Digital Competency by integrating the Nordic Model of education (21,27). Under this model, human autonomy and democratic citizenship are prioritized under the concept of Bildung (27). This is applicable to both instructors and learners, making education a co-constructive process where meanings and solutions are co-created in a multidirectional way (21,27) (Figure 6).

Meaning is understood as context-dependent, rather than imposed in a unidirectional top-down or bottom-up structure. Context-based thinking is a necessary skill specifically regarding conversations on ethics and responsibility concerning digital technologies, given that issues involving ethics are context-specific and difficult to measure quantitatively (21). This is particularly true at a global scale, given that studies have shown that the meaning of "digital literacy" and "competency" varies between languages as well as the individuals and communities that use them (23).

What Can We Do?

Unidimensional & Unidirectional
Approaches

Multidimensional & Multidirectional
Approaches

Nordic Model

Bildung   Co-Construction   Nonlinearity   Contextual

Reflexivity

Multimodal

Autonomy

Interdependency   Transdisciplinarity   Responsibility

Figure 6: Transitioning toward multidimensional and multidirectional approaches.

Figure 7: The diverse ways in which the Alliance interpreted "sustainability". Terms collected during the first GADES meeting.

Approaching discussions on the concept of Digital Literacy and Digital Competency may therefore entail exploring alternative terminologies and ways of conceptualizing shared understandings and goals within a community of practice, which recognizes that they may transform over time depending on the context.

It is with these considerations in mind that GADES began exploring shared understandings and goals around a new form of digital and AI literacy with consideration for sustainability (Figure 7 demonstrates GADES's priorities and interpretations for "Sustainability").

3. GADES PERSPECTIVES: RE-IMAGINING DIGITAL AND AI LITERACY IN A SUSTAINABLE PLANET
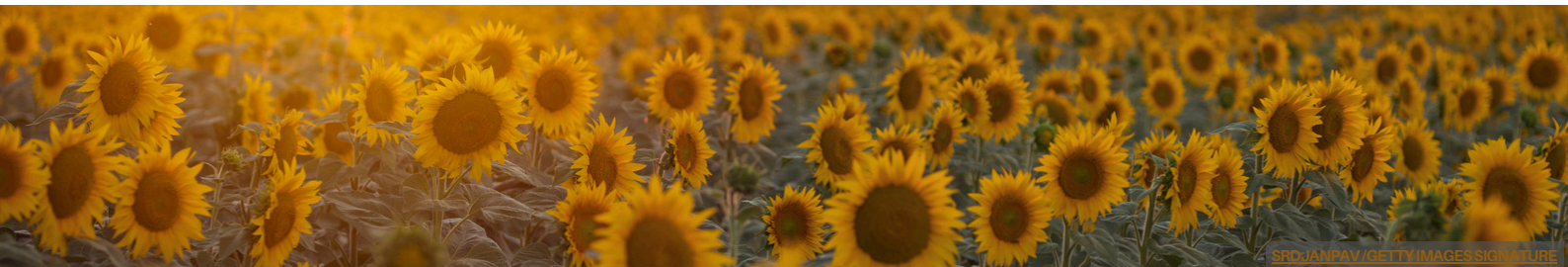
In pursuing a revised definition for digital literacy that also incorporates education around the sustainable use of digital technologies, GADES identifies the following:

I. **Considerations to keep in mind when designing education programs:**

- Accessibility (technological and otherwise)
- Understand existing literacy and education levels to adjust to specific cohort needs (for example avoiding content that is too technical for audiences without a technological background)
- Multiple languages and culture
- Different target-audiences (academics, policy-makers, industry, etc.)
- Perspectives from various disciplines
- Impacts on well-being (mental and digital)

II. **Approaches and tools that educations can adapt:**

- Flexibility
- Creative & Critical Thinking
- Problem-based learning
- Personalized Communication
- Inclusive and open to all voices (diversity)
- Concise & impactful
- Butterfly Diagram
- Doughnut Economy Concept
- Fun activities promoting citizen action
- Universal Design for Learning (UDL) Principles
- Offer hands-on activities leading to real-world application

III. Content that should be included in education programs around digital and sustainability:

- Relationship between digital literacy and sustainability
- Clear definitions of terms and concepts (both separately and their intersection), for example definitions of literacy, digitalization, and sustainability that resonates with the target audience
- Digital skills
- Ethics and values
- Digital Citizenship
- Real-world case studies illustrating this intersection
- Sustainability in different contexts
- AI
- Potential career and entrepreneurship opportunities
- Critical thinking - understanding how digital tools work, how an answer is produced etc.
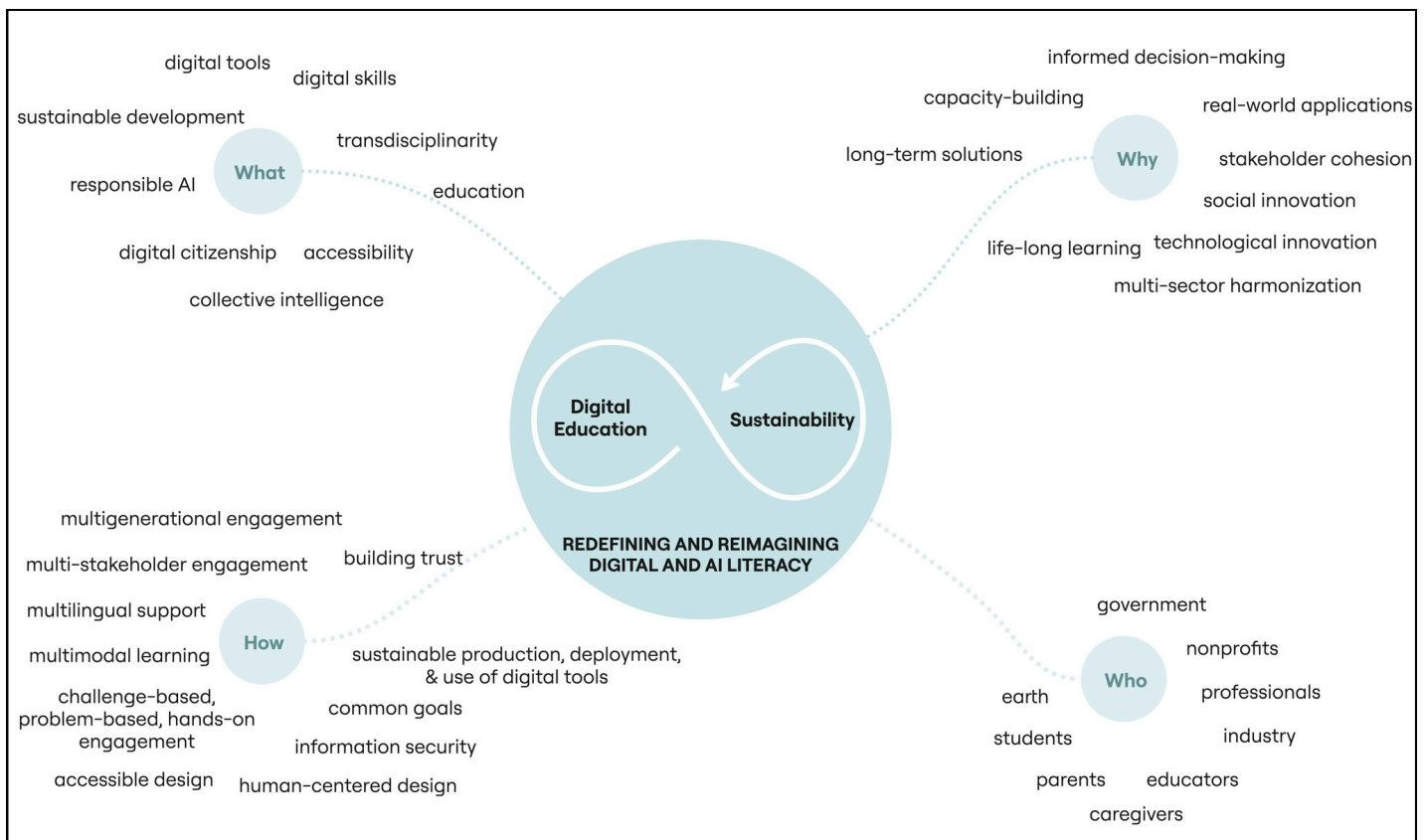
Figure 8: Summarizing GADES's interpretation of re-imagining digital and AI literacy by including education around the ethical, safe, and sustainable design, development, and use of digital technologies. What should the content be? Why is it necessary? How can it be achieved? Who will it benefit?

4. GADES PERSPECTIVES: ADVANCING DIGITAL EDUCATION & SUSTAINABILITY - CHALLENGES AND RECOMMENDATIONS

ROMAN POHORECKI/PEXELS

The section below summarizes key insights and perspectives gathered from collective intelligence exercises conducted by GADES on the challenges and opportunities to advancing digital education and sustainability. Challenges were identified as barriers to building a society able to **1. use and engage with AI and digital technologies with safety, security, and inclusivity in mind 2. understand and** **mitigate the direct and indirect impacts of digital technologies, and 3. practice digital hygiene to take control of their digital/online presence.** Over 80 stakeholders from 23 nations spanning 5 continents, with diverse expertise and interest in sustainability, education, and digitalization were engaged. Challenges are ranked in order of priority as identified by GADES.

IN 2024 →

5
CONTINENTS

23
NATIONS

80+
STAKEHOLDERS

4.1 Misinformation

Misinformation has become an increasing concern, given advancements in AI-driven content creation. This is followed closely by **social and/or political polarization**, often cited as a result of misinformation and disinformation (28). The World Economic Forum's 2024 Global Risks Perception Survey, collecting insights from nearly 1500 experts in academia, government, private sector, and civil society, also perceives AI generated misinformation and disinformation and Societal and/or political polarization to be the first and third biggest global risks respectively for the period 2024-2026 (4). Education, awareness, and literacy around misinformation in the digital realm and how to tackle it is key to addressing this challenge and increasing the safe use of digital technologies.

INTERVENTIONS

LABEL AI GENERATED CONTENT
Establish policies and enforce labeling of AI generated content.

CRITICAL THINKING SKILLS-BUILDING
Integrate critical thinking skills-building within educational and awareness programs: educate individuals on how to discern reputable sources and recognize misinformation and how to critically evaluate arguments and claims on complex issues.

MULTIGENERATIONAL EDUCATION
Awareness and education around misinformation across all ages is crucial to bridge knowledge gaps between generations.

DIGITAL/CYBER HYGIENE
Exercise digital hygiene through cybersecurity practices and informing users on how algorithms (e.g. gamification strategies) influence their perceptions and behaviors.

EXAMPLES

CRANKY UNCLE GAME
Topics: critical thinking skills , media literacy, gamification
The Cranky Uncle game helps players recognise 14 techniques of science denial, including cherry picking, fake experts and a variety of logical fallacies. The deeper a player gets into the game, the more resilient they become against misinformation. The game is already available in 12 different languages with many more planned and the concept of a "Cranky Uncle" is recognised across different cultures. For example, one version of the game in Africa has a Cranky Uncle that aims to dispel misinformation on vaccinations. You can download the Cranky Uncle game from your app store or play it in your browser (https://crankyuncle.com/game/).

4.2 Accessibility

Access to technology can impact access to **education** and **capacity** building opportunities. Barriers to technology may include: physical infrastructure (e.g. internet access, hardware access), affordability (e.g. internet subscription and hardware costs), closed platforms, and capacity to leverage digital resources. Limited access to technology contributes to the **digital divide**, resulting in reduced or limited access to education, jobs, and increased resources spent on accessing technology.

For example, in the state of New York, 8% of students do not have access to a digital device at home and 6.3% do not have sufficient access to the internet, which can inhibit learning opportunities (29). In addition, when access to the internet is not readily available, individuals can spend more resources (e.g time spent traveling to different locations) trying to gain access.

High tech solutions can reduce accessibility where the capacity to understand technological solutions remains insufficient. With nearly 50% of online digital content being in English (30) language barriers can also limit access to digital resources. Internet costs are also highly regionalized. For example, a recent report by Surf Shark shows that in Zimbabwe, the hours an individual has to work to be able to afford monthly fixed internet is 12 times higher than the global average (31).

INTERVENTIONS

ACCESSIBLE DESIGN
Ensure easy access to learning material for example by making it available through tools such as mobile phones, translation into local languages, and designing for disabilities.

SIMPLIFY INFORMATION
Explore innovative and effective ways to communicate key messages (e.g. environmental impacts of AI) in digestible formats that can be disseminated widely.

CAPACITY ASSESSMENT
Gauge where a community/target audience is in relation to understanding digital tools, content. and impact. This will allow in the development of relevant learning material that addresses an existing need.

SUBSIDIZE TELECOMMUNICATIONS
Begin dialogues with government agencies to increase awareness of the costs of the internet and encourage the building of coalitions to advocate for accessible and cheap internet.

CONNECT COMMUNITIES
Better understand barriers to existing and emerging technologies as well as different perspectives around them.

OPEN-TECH ADAPTATIONS
Removing barriers to accessing or developing digital tools through open-hardware and open-source can help democratize access and use of technology and facilitate collective intelligence and innovation. Users able to take ownership of their hardware and software are better equipped to find alternative solutions to complex problems.

EXAMPLES

iAfrika DIGITAL
Topics: digital learning in local languages

iAfrika provides digital platforms for cultural and linguistic learning online in order to better represent the diversity of voices throughout the African content. The primary focus is on enabling access to local knowledge and languages both as a way to encourage learning for local communities, but also for cultural awareness outside of Africa. Access to knowledge through digital platforms is meant to empower individuals from local communities toward societal change. The organization partners with local universities, libraries, archives, museums, government, and private institutions in order to accomplish this goal.

4.3 Receptivity

Cultural aspects and priorities impact the extent to which individuals and communities will **accept** or **invite** education around **digital technologies** and **their sustainability**. This can include regional disparities in the use of technologies, past experiences with the tech sector, and trust in technologies. It is important to center regional programs and projects on the different cultural settings in which they exist.

INTERVENTIONS

COMMON UNDERSTANDING & GOALS
Together with local communities and stakeholders co-define digital literacy and common goals around digital technologies and sustainability.

CONTEXTUALIZED EDUCATION
Together with local stakeholders, co-design education programs and platforms based on regional capacity needs and availability of infrastructure.

DETERMINE LOCAL RELATIONSHIP TO DIGITAL
An analysis such as a survey and statistical analysis can help provide an initial understanding of how comfortable a population is with digital technologies and recognize demographic trends with level of acceptance or use of technologies.

COMMUNICATE DIGITAL RIGHTS
Build community understanding of what their digital rights are - making T&Cs more accessible, while advocating for for Cyber-Hygiene skills and anti-malware protections (32).

BUILD CURIOSITY & TRUST IN TECH
The complexity and privacy concerns of technologies may lead to skepticism and distrust in technological innovations. Creating safe spaces for diverse stakeholders to convene and discuss concerns can provide an opportunity to practice transparency around these technologies. Initiating dialogues between small groups can be a starting point to help build curiosity and raise concerns.

ENFORCE CYBERSECURITY POLICIES
Ensure secure data storage, ensure fair use of user content, and increase transparency around user consent with respect to software agreements.

EXAMPLES

Digital Humanities Smart Leadership for Interdisciplinary Talent Program
Topics: technology for humanistic endeavors
This project aims to integrate digital humanities interdisciplinary education into public and private university curriculum. The program will help students enhance their humanistic literacy and explore the roles and values of humanities and social sciences in a transforming society.

4.2 Fragmentation

Fragmentation between stakeholders working in academia, sustainability research, and digital innovation limit the availability of interdisciplinary and transdisciplinary programs that build **holistic awareness**, **education,** and **capacity** around AI & digital literacy and sustainability.

For example, digital technology industries and academia still exist in **silos**, where digital technologies are designed and developed without sustainability criteria. Education is predominantly still siloed, with inter- and transdisciplinary learning still in its infancy.
In addition, selected groups (such as older generations) have limited access to AI and digital literacy programs. This fragmentation inhibits knowledge sharing across diverse groups of stakeholders and prevents holistic thinking around digital technologies.

INTERVENTIONS

EXPAND COMMUNITIES OF KNOWLEDGE AND PRACTICE
Create spaces for diverse groups (including but not limited to stakeholders working in technology and innovation, academia, sustainability research, policy design) to practice cross sector learning. These spaces can encourage the generation and scaling of alternative solutions through collaboration.

DESTIGMATIZE FAILURES
By openly sharing failures, stakeholders are able to widely share lessons learnt and move towards a community of practice that is more open, agile and collaborative (33).

MULTIGENERATIONAL EDUCATION
Programs should be tailored to reach people where they are in terms of capacity and understanding, accessibility, and relevance.

INTERDISCIPLINARY AND TRANSDISCIPLINARY EDUCATION
Introduce education programs that embed digital skills and sustainability principles across diverse disciplines.
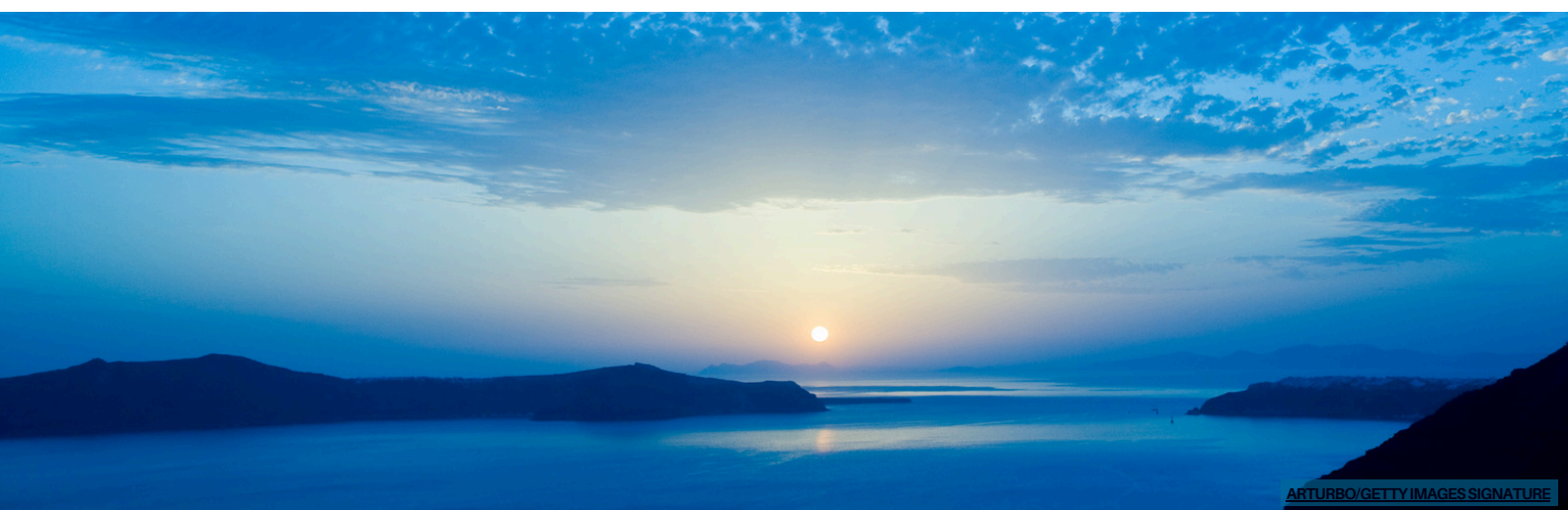
eLiteracy Café (by LabXR_PUCP)
Topics: multigenerational digital literacy, parental education
A regional, hybrid, working group in Peru headed by LabXR PUCP. In face of the fast pace of technological development of daily digital means, it is difficult to keep up with the hazards and risks which they can generate for all, and specially for youngsters. Parents (an often ignored public in this context) feel overwhelmed, and have an urgent need to learn about how they can protect their children and foster their adequate use of these means. The program, a work-in-progress, aims to utilize the strategy of impulsing self-organized groups to help parents discuss, find and share resources. Resources that will help them learn and maintain literacy in means of impacts and forms of emerging technology.

LEADS (Leadership in Environmental and Digital innovation for Sustainability)
Topics: multidisciplinary, bilingual, sustainability & digitalization
A unique graduate training program that draws the science of the current sustainability crisis to identify where and how digital tools can be used to accelerate the transition to global sustainability. The program explores three themes: Climate change mitigation & resilience, advancing systems-based approaches to SDGs, and enabling the transformative power of sustainability in the digital age.

Explore our GADES Database for more examples:
A multitude of educational approaches must be utilized to promote these ideals on a wide-scale and global level. One of the goals of GADES is to establish an open-source database that will highlight and characterize existing education initiatives, around the world, focusing on digital and sustainability literacy. In the spirit of harmonizing solutions, one of the aims of this database is to compile existing programs in one space. This would help to avoid repetition, and identify where education deficits may exist and on what levels. Compiling the database is an on-going process.

Access the database here.

5. NEXT STEPS FOR GADES

FERNANCHEF/ GETTY IMAGES
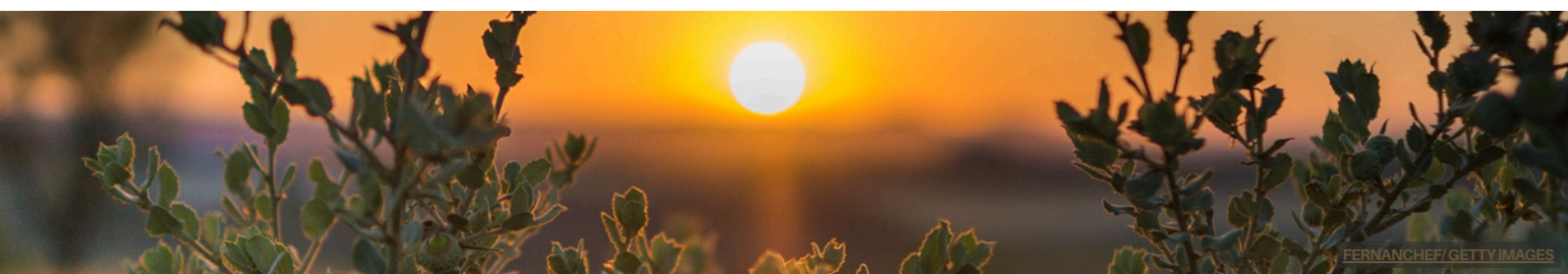
GADES was set up in response to the growing concern around digital technologies and the consequent changes of landscapes in employment, education, sustainability, just to name a few. Since its inception in December 2023, GADES has built a growing community of actors interested in reimagining and advancing a new AI & digital literacy, with consideration for sustainability principles, to help build a society capable of designing and using digital solutions without adding to social inequality and the on-going environmental crisis.

By identifying what this new form of AI & digital literacy can look like (section 3) and how we can overcome current challenges in building AI & digital literacy with sustainability principles (section 4), we present priority action areas with real-world examples. We bring forward valuable key messages, concerns, and opportunities as identified by the GADES community that are based on lessons learned from experiences in implementing action at the grassroots level. We believe these findings can advise policy making at the local, regional, and global levels.

Our key focus areas of action moving forward include:

Co-design and scale solutions
By leveraging the network of diverse stakeholders, we hope to work together to advance projects based on interventions proposed at the local, regional, and global levels, build multidisciplinary and globally diverse teams, and share knowledge and lessons learnt to build collective intelligence around digital and AI literacy and sustainability.
Focus areas can include: Ethical AI for Education and Sustainable Development, Technology Enhanced Active Learning, and Sustainable Digital Transformation.

Bring local and regional expertise to global policy and discussions on Digital and AI literacy in a sustainable planet
GADES bridges diverse voices from practitioners, researchers, and industry across geographies and sectors with policy makers and global actors. By doing so, we can help design action plans or policies around the topics of digitalization, literacy, AI, and sustainability that are effective and respond to needs and priorities at the ground level.

ACKNOWLEDGEMENTS

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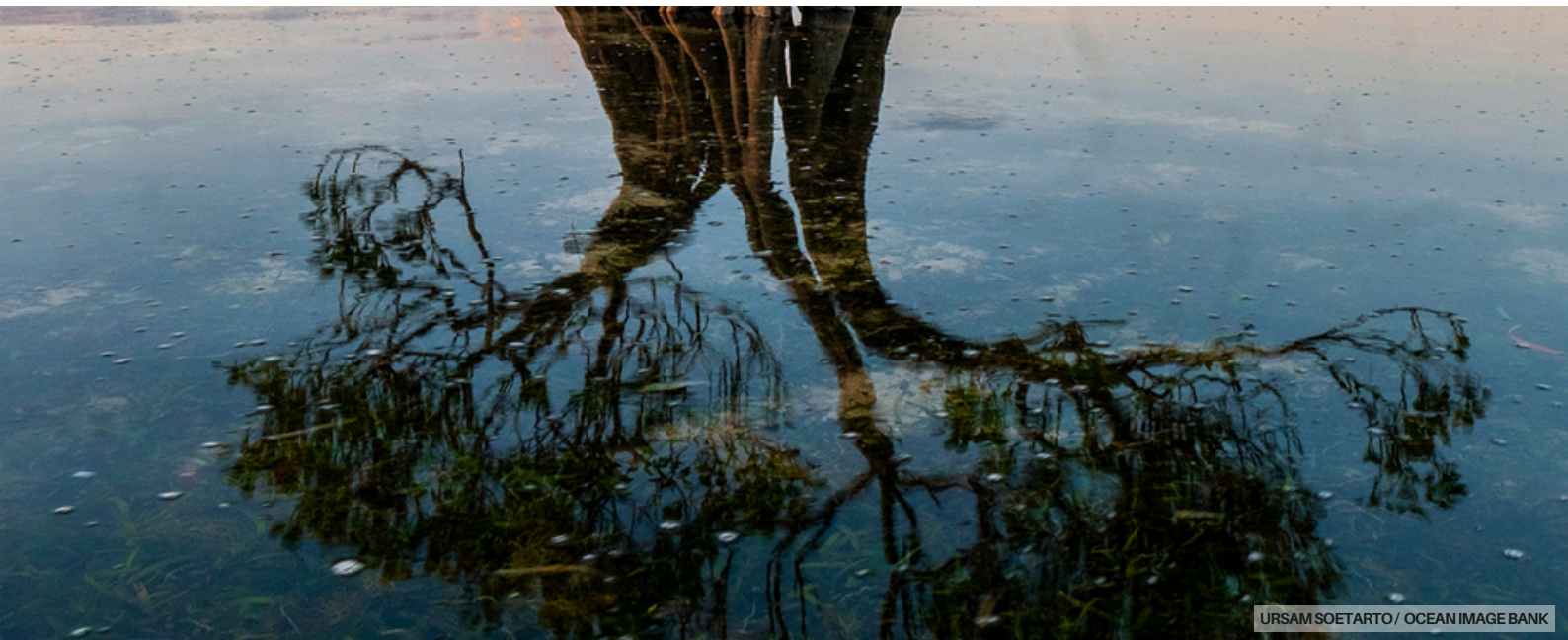
We are immensely grateful to the members who make up the GADES community and for the time, commitment, and resources they have contributed to this important work. We are proud of the diverse disciplines and geographies we represent in GADES and we are excited to continue to grow and reach a wider audience in the next year of our work.

MORE INFO

EXPLORE **HERE**
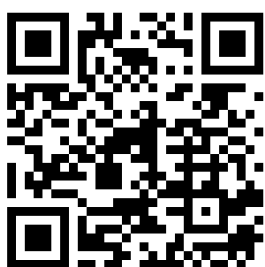
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JOIN US

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NILUSHI KUMARASINGHE, SUSTAINABILITY IN THE DIGITAL AGE & FUTURE EARTH

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ANNEX 1: ENDORSEMENT

This report reflects the perspectives collected across workshops conducted in 2024. In total over 80 stakeholders were consulted across the workshops held. In addition, this report has been further endorsed by the following members of GADES:

Affiliations are listed for identification purposes only. The views presented in any given section of this report do not necessarily reflect those of any listed affiliated institutions.

Name	Based in	Area(s) of focus	Affliliation
Nouira Mohamed Salah	Tunisia	SDGs and climate change, remote sensing data Blockchain and IoT	Ministry of education
Prof. Dr. Meltem Huri Baturay	Türkiye	SDGs	Konya Food & Agriculture University, LET-IN R&D
Maria de la O Laura del Carmen Cuevas Cancino Esteva	Mexico	Sustainability, educational innovation, AI	Tecnologico de Monterrey
Marisa Zalabak	USA	AI Ethics & Climate Repair	IEEE & Open Channel Culture
Mohamed Essaaidi	Morocco	SDGs, AI, Education	IEEE / EMSI
Nilushi Kumarasinghe	Canada	Digital sustainability, environment management	Future Earth, Sustainability in the Digital Age, CODES
Henry Kafeman	United Kingdom	Sustainability, Engineering, Education	HDK Solutions Ltd.
Monika Manolova	Bulgaria	AI, Digital Skills, and AI Ethics	Digital National Alliance

Name	Based in	Area(s) of focus	Affliliation
Calvain Nangue	Rwanda	SustainabilityDigital LiteracyDigital SkillsTransforming Education	Smart Africa Alliance
Josine Overdevest	South Africa	Digital Skills Gap. Digital ethics, digital education, digital sustainability.	Flying Cows of Jozi
Maria MacAndrew	Ecuador / South Africa	Environmental EducationAI EthicsDigital LiteracySocial Impact	My Zalu / AI Ethics World
Errol Finkelstein	Wales	AI & Environmental Practitioner	CHIPX Group UNESCO Biosphere ReservesThe Life Map FoundationGen-C Green Education
Miloš Dimitrijević	Serbia	SDGs	University of Kragujevac, Department of Economics
Anelia Dimova	Bulgaria	Information Technology & Information Society	Ministry of e-governance
Eric Hansel	USA	Youth engagementWeb3, Sustainabilitygaming	The Scubaverse, CODES
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Andres Leon-Geyer	Peru	XR and emerging technologies ethics, Digital Literacy and Culture	LabXR, Pontifical Catholic University of Peru (PUCP)
Sichu Shrestha	Thailand	Digital Literacy, Sustainability, Data-driven decision making	Global Water & Sanitation Center (GWSC), Asian Institute of Technology (AIT)
Kavinda Gunasekara	Thailand	Digital Literacy, Sustainability, Digital Public Infrastructure	Global Water & Sanitation Center (GWSC), Asian Institute of Technology (AIT)

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Muhammad Amin Nadim	Italy	SDGs, AI, Education, Gen AI, AI Ethics, Data-driven decision making	National Doctorate in Learning Sciences and Digital Technologies (University of Foggia & University of Telepegaso, Italy)
Thelma Quaye	Ghana	SDG, Transforming Education	Smart Africa Alliance
Jane Ezirigwe	Canada/Nigeria	Governance of data, Responsible AI and Human Rights; Food & Agriculture	University of Ottawa; Nigerian Institute of Advanced Legal Studies
Bendjedid Rachad Sanoussi	Benin / Morocco	Digital transformation, Climate change, Policy, Management	Green Leaf AI, Euromed University of Fes
Ju-Ling Shih	Taiwan	Humanistic AI, Instructional Technology	National Central University
Vibhav Mithal	India	Artificial Intelligence and Law	Anand and Anand + Associate Research Fellow, Centre for Responsible AI, IIT Madras
Oleg Missikoff	Italy/Uganda	Sustainable Digital Transformation, AI for Prosperity	Earth 3.0 Foundation, Sapienza University of Rome

ANNEX 2: GLOSSARY OF TERMS

JONAS_FEHRE/PIXABAY

We acknowledge there is no universal consensus on some definitions, but those presented here represent the understanding/interpretation of the Alliance in the context of this report.

- **Artificial Intelligence (AI)** coined by John McCarthy in 1955, and defined as "the science and engineering of making intelligent machines." Three common goals of AI include: artificial general intelligence (AGI), applied AI, and cognitive simulation [1,2,3].
- **Community of Practice:** coined by Etienne and Beverly Wenger-Trayner, and defined as "sustained learning partnerships among people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" [4,5,6,7].
- **Digital Divide:** the gap between populations with respect to access to technology, digital skills and usage, and outcomes of technology use. These gaps can be caused by or worsened by social inequality, and can be a limiting factor for future social and economic opportunities [8,9,10,11].

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- **Digital Hygiene:** aka Cyber Hygiene refers to the awareness, knowledge, technical capacity, and enactment of cybersecurity practices, which together comprise 3 main categories of assessment: cognition, behavior, and access to technology. Digital/Cyber Hygiene falls under the Safety competency under DigiComp 2.2 defined by the European Commission and is a component of the Safety pillar within Digital Literacy defined by the USAID [12, 13, 14, 15, 16].
- **Digital Literacy** the USAID defines Digital Literacy (DL) as the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital devices and networked technologies for participation in economic, social, and political life. Emphasis is placed on capacity (ability to use technology) and safety (ability to protect against potential harms like misinformation through digital/cyber-hygiene). MNET identifies 3 main actions associated with DL: access/use, understand, create, which overlap with USAID conceptualizations. Skills associated include: innovation, constructive social action, and critical and creative thinking [17].
- **Digital Competency:** defined by the European Commission as the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking [18].
- **Digital sustainability:** mitigating the negative impacts of the digital transformation, incentivizing digital innovation for sustainability, and aligning the digital and sustainability communities [19].
- **Digitization**: converting information from analog/paper-based records to digital files [20]
- **Digitalization (see also: link):** Use of digital technologies to turn products and services into a digital format to drive efficiency and innovation [see footnote 19].
- **Digitalization for Sustainability:** Digital innovation that seeks to proactively enable, accelerate and scale environmentally and socially sustainable development. In the CODES Action Plan, this refers to shift 3 and the 6 related strategic priorities [see footnote 19].
- **Digital Transformation:** Systems-level economic, societal and environmental transformations triggered as a result of digitalization [see footnote 19].

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- **Digital upbringing:** parenting practices that maximize the benefits and minimize potential risks of children's interactions with digital media and online spaces [21, 22]
- **Inclusion :** removing barriers perceived to be unfair, and accepting differences within an organization. Argued to be necessary in order to achieve Equity and Diversity [23, 24, 25].
- Equity: treatment perceived to be fair, which can be same or different between persons within an organization. Argued to be a consequence of Inclusion [refer to footnote 25, 26, 27]
- Diversity: the heterogeneity of individuals based on demographics, perspectives, and other socially significant differences that impact their acceptance, performance, satisfaction, or progress in an organization. Argued to be a consequence of Inclusion and Equity [refer to footnote 24, 25,26].
- **Sustainable Digitalization:** Digital infrastructures, software and applications that are socially responsible, ethical and environmentally sustainable throughout their lifecycle. In the CODES Action Plan, this refers to shift 2 and the 6 related strategic priorities (refer to footnote 19)
- **Sustainability:** meeting the needs of the present without compromising the ability of future generations to meet their own needs [27].
- **Transdisciplinarity:** extends beyond disciplinary boundaries and generates new knowledge from "cross-fertilization" of a diversity of perspectives, while involving non-academic participants in order to find innovative solutions to complex problems. It is a process of collaborative deconstruction and co-construction of knowledge and solutions that involves logical reasoning and imaginative thinking [28,29,30].
- Multidisciplinarity: different disciplines working independently on a common theme; some exchange and comparison of results occur but ultimately separate projects

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