Six pillars for the digital transformation of education

A common framework

unesco

ITU

unicef
for every child

GPE Transforming Education

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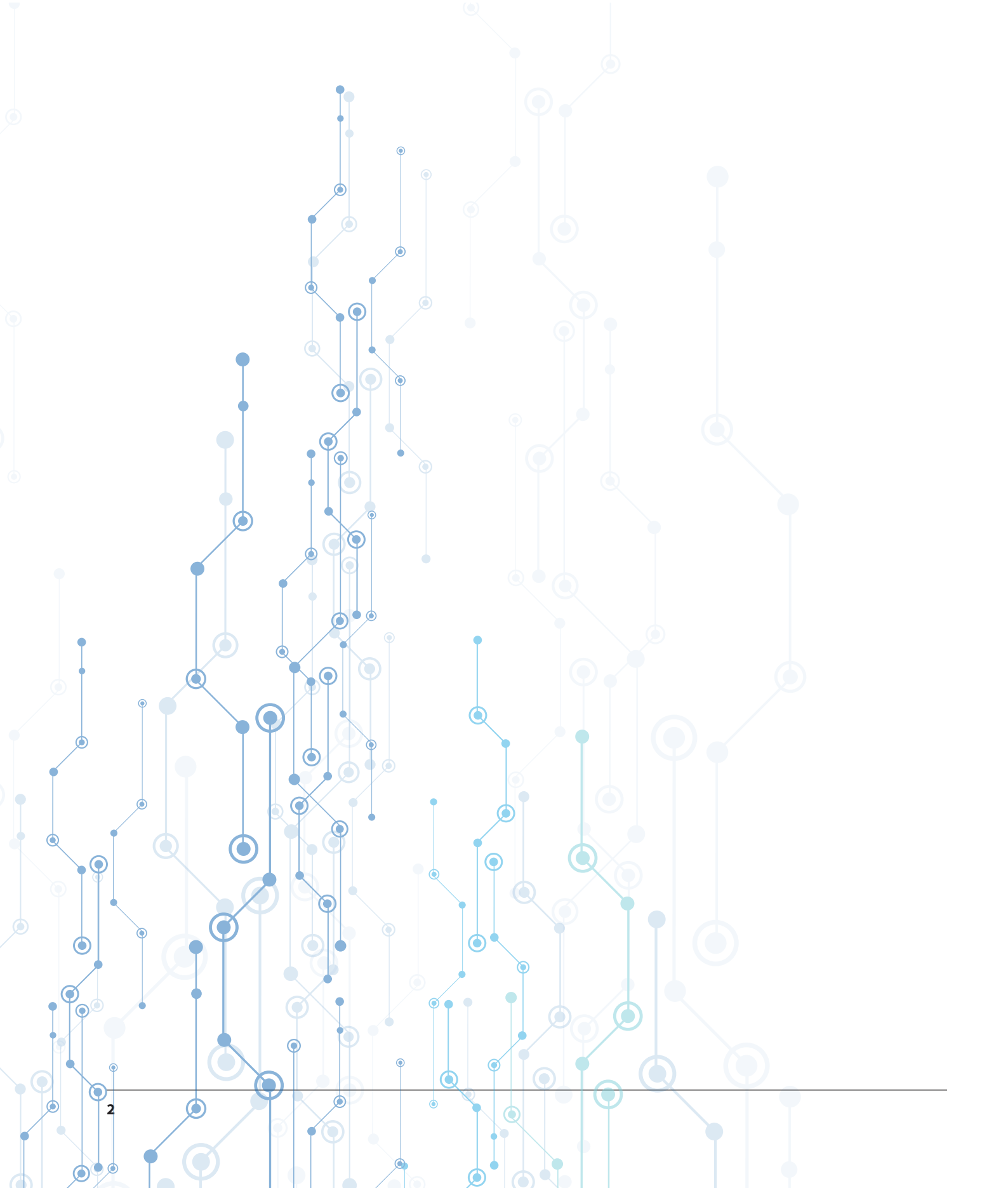


Introduction

With the launch of the Global Digital Compact at the 2024 United Nations Summit of the Future, the countries of the world ushered in a new international consensus on the role of technology to build a better present and secure a more sustainable future. Neither this present nor future can exist without education. Given the barriers to educational quality and equity the world over, the education sector stands to benefit from the innovative possibilities afforded by technology. But, by and large, equity has not steered digital transformation globally, and quality has not driven the development of education technology. The Global Digital Compact calls for cooperative action across sectors and stakeholders to close the multifaceted digital divide and harness the potential of technologies to accelerate the achievement of the Sustainable Development Goals.

In the spirit of this compact, the partners of the Digital Transformation Collaborative (DTC) – a sub-group of the Global Education Coalition launched by UNESCO in March 2020 – have come together to create a common framework for digital transformation that targets the specific needs of the education sector. With multilateral agencies at the helm, the framework was co-created over a two-year period by experts of the DTC, which includes intergovernmental and civil society organizations, private sector partners and educational institutions.

This document breaks down the essential components of digital transformation in education from a systems perspective. The outer layer of the framework represents the vision (purpose, priorities and principles) while the inner layer comprises the six pillars: coordination and leadership; connectivity and infrastructure; cost and sustainability; capacity and culture; content and solutions; and data and evidence. The framework serves as a tool to support decision-makers in the development of a holistic vision and participatory strategies for the use of technology to advance education system goals, allowing education stakeholders who use it to respond more effectively to new developments, emerging technologies and evolving educational needs.

Research, policy resources and country consultations, including with ministries of education and ministries of communications, provided the basis for the iterative creation of the six pillars and their descriptive components. The framework aligns with global standards and international education goals – notably, Sustainable Development Goal 4 (SDG 4). With diverse actors working in sync to achieve country-led objectives and using this common vernacular to understand transformation, resources such as funding, expertise and technology can be distributed more effectively, ensuring that they complement each other to reach areas with the greatest need and potential impact.

All countries – no matter their location or stage of digital development – can reflect on their education transformation journeys through the lens of the framework, using it to identify opportunities to advance digital transformation to improve the quality, equity and inclusivity of their education systems. The purpose of this paper is to advocate for a systems-led, human-centred, holistic, sustainable, balanced and forward-thinking approach to the digital transformation of education. It provides detailed descriptions of and recommendations for each pillar, followed by an explanation of how to and why countries should use the framework as a tool for collaboration and strategy development.

"**Our cooperation must be agile and adaptable to the rapidly changing digital landscape**. As governments, we will work in collaboration and partnership with the private sector, civil society, international organizations, the technical and academic communities and all other stakeholders, within their respective roles and responsibilities, to realize the digital future we seek."

– Global Digital Compact, 2024
(Draft – Revision 3)

Acknowledgements

First and foremost, we are grateful to the many partners of the Digital Transformation Collaborative who contributed to the development and improvement of this framework and its corresponding descriptive maturity model. This document was prepared by a core team of the DTC Steering Group, led by UNESCO, UNICEF and Microsoft, and including ITU, GPE, Ericsson, Google and ProFuturo. We acknowledge the complementary initiatives such as the ITU-UNICEF 'Giga' initiative to connect every school to the Internet, the UNESCO-UNICEF 'Gateways to Public Digital Learning', GPE's 'Tech4Ed', and the 'EdTech For Good' initiative of UNICEF's Learning Innovation Hub, which have informed and inspired this common framework.

To the many field offices and countries, including ministries of education and ministries of information and communication technology, that have provided feedback on the iterations of the framework and its descriptive maturity model, we express our sincerest thanks.

Digital Transformation Collaborative (DTC) Contributing Partners

The need for a common approach

Digital transformation in education is not simple. The process requires many pieces and partners to move forward together. Sustained and synergistic movement is a challenge when some pieces are more developed than others or when stakeholder incentives are misaligned. Further complicating matters, the technology landscape is changing too fast for most education policy-makers and experts in digital learning to keep up. For education to embrace present and future technological transitions, approaches need to shift from rigid, piecemeal and tech-first to holistic, systems-oriented and human-centred.

To support this mindset shift, there is a dire need for a common framework to describe the big picture of digital transformation in education. Defining this picture is beyond the purview of any one governmental department or ministry. National education leaders should work in collaboration with education professionals, learners and other key stakeholders to endorse it and co-create a plan for its implementation. Operationalizing and resourcing such a plan requires close cooperation with other government bodies leading digitalization, regulation, communications, social development, finance, commerce and beyond. Collaboration between governments, civil society and private-sector partners must be grounded in transparency, accountability and inclusiveness to safeguard education as a common good.

In many ways, digital transformation in education is a play with many acts and a wide variety of actors. Each actor needs to know their role, lines and marks as well as when and where to use their props. Often, the play is produced and directed by the ICT sector alone, which can steer the plot away from education priorities. An education-specific framework serves as a script to clarify the vision, purpose, roadmap and required resources for all involved.

"Two years ago, education partners met at the Transforming Education Summit, recognizing the need for coordinated action to help countries use technology to achieve education goals. This led to the formation of the Digital Transformation Collaborative within UNESCO's Global Education Coalition.

Today, the collaborative has expanded in size and commitment to leveraging our collective expertise to support countries in one voice. **The six pillars framework gives us the common language to steer technology on our terms**."

— Stefania Giannini, Assistant-Director General for Education, UNESCO

A tool to foster cooperation across sectors and partners

A framework that all stakeholders can align with is essential to the creation of a cohesive, efficient and effective approach to leveraging digital technology for education system transformation. From change management and funding models to platforms and artificial intelligence (AI), the framework encompasses a diverse digital ecosystem that implicates policy-makers, service providers and practitioners alike in designing and delivering a plan based on its components. Given the diversity of public and private interests in this process, it is essential that each stakeholder is aligned on the overall reason for leveraging technology in education and is committed to the principles of ethical, equitable, and human-centred practices. Strong governance structures are critical to support this alignment, balance private-sector involvement with accountability and ensure that education remains a public good.

A tool to help education leaders strategize and self-assess

A vision for the digital transformation of education should be accompanied by systems- oriented, long-term, participatory change management strategies that target incremental initiatives. These strategies should be informed by evidence and developed through the sustained and structured involvement of multiple ministries, stakeholders and educators. The framework is accompanied by a maturity model that describes three stages of a digital transformation journey – from emerging to progressing to transforming. The descriptions of each stage allow leaders to identify their comparative levels of progress across six key pillars of digital transformation in education. In turn, this provokes a participative analysis of priority areas of need to balance progress evenly across all six pillars. Ultimately, this assessment process aids in the co-creation of a transformative vision for technology in education across six key pillars, which can then be translated into concrete strategies and implementation plans.

A tool that actors can adapt to their contexts

The system framework helps all education actors and stakeholders navigate the complexity of the changing educational landscape in the digital age. It offers a holistic perspective on education transformation through the lens of technology, enabling government officials to consider how technology can be used to advance education system goals. Additionally, it empowers decision-makers to articulate a clear vision to identify the most appropriate tools and processes for each learning environment within their system. The framework is designed to be agnostic to any specific solution, with the intention that it can be revisited and refined as both education and technology contexts shift over time.

Outer layer: Priorities, purpose, principles

Three components constitute the outer layer of the framework: purpose, principles, and education system priorities. These elements envelop the six pillars, implying that the entire process of digital transformation in education should be needs-driven and fit-for-purpose, grounded in the specific priorities of the education system and aligned with the principles of human-centred, ethical, sustainable and forward-thinking use of technology in education.

Education system priorities

Before embarking on a digital transformation journey, it is critical that the vision of the education system be embedded as the north star, which may be articulated in a sector plan or policy document. This vision transcends technology and addresses the fundamental 'why' of an education system, including the philosophical and theoretical foundations upon which the vision is constructed.

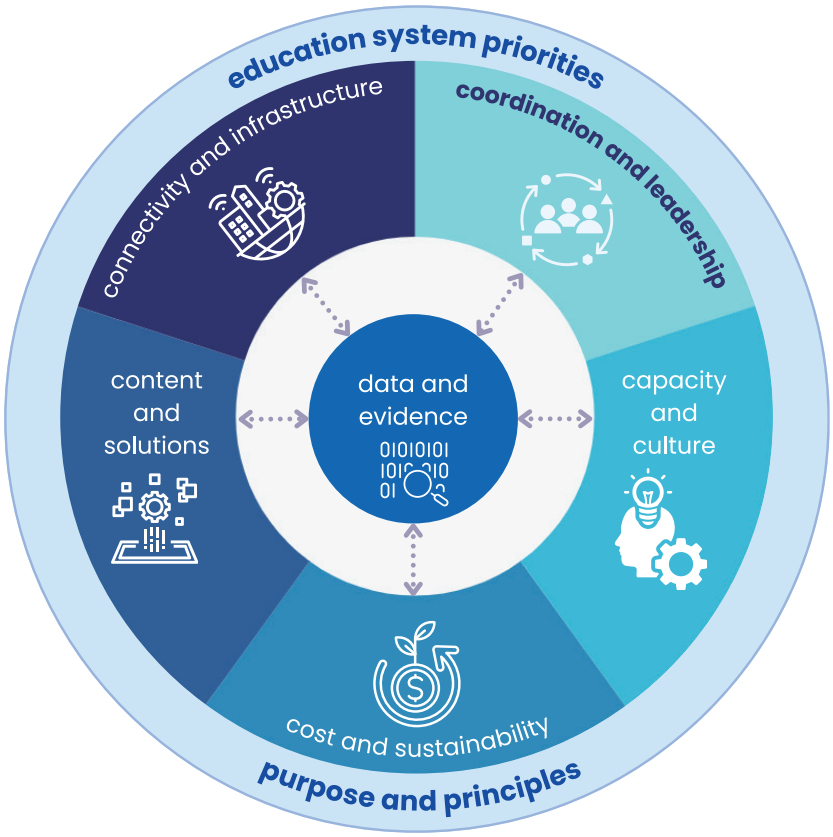
Purpose

The framework then encourages national officials to reflect on the needs-driven purpose of digital transformation within this vision. In other words, it prompts an explanation of why technology could be used to accelerate the achievement of these education goals. This essential step ensures that digital transformation in education is fit for purpose rather than technology driven, focused on social impact, based on data and evidence, and integrated into broader educational policies and strategic priorities of the education system, which can facilitate long-term planning and sustained partnerships.

Principles

The entire process of transformation should be rooted in normed principles for ethical, safe and effective use of technology in education. While a range of such principles exist from various sources, they generally converge around equity, inclusion, gender equality, sustainability, scalability, safety and transparency. Common adjectives attached to these principles include human-centred, rights-based, purpose- driven, evidence-informed, iterative, ethical and empowering.[1]

Figure 1.1 Priorities, purpose, principles and pillars of the framework



Note. Adapted from the Digital Transformation Collaborative. (2024). https://www.unesco.org/en/global-education-coalition/digital-transformation-collaborative. © UNESCO

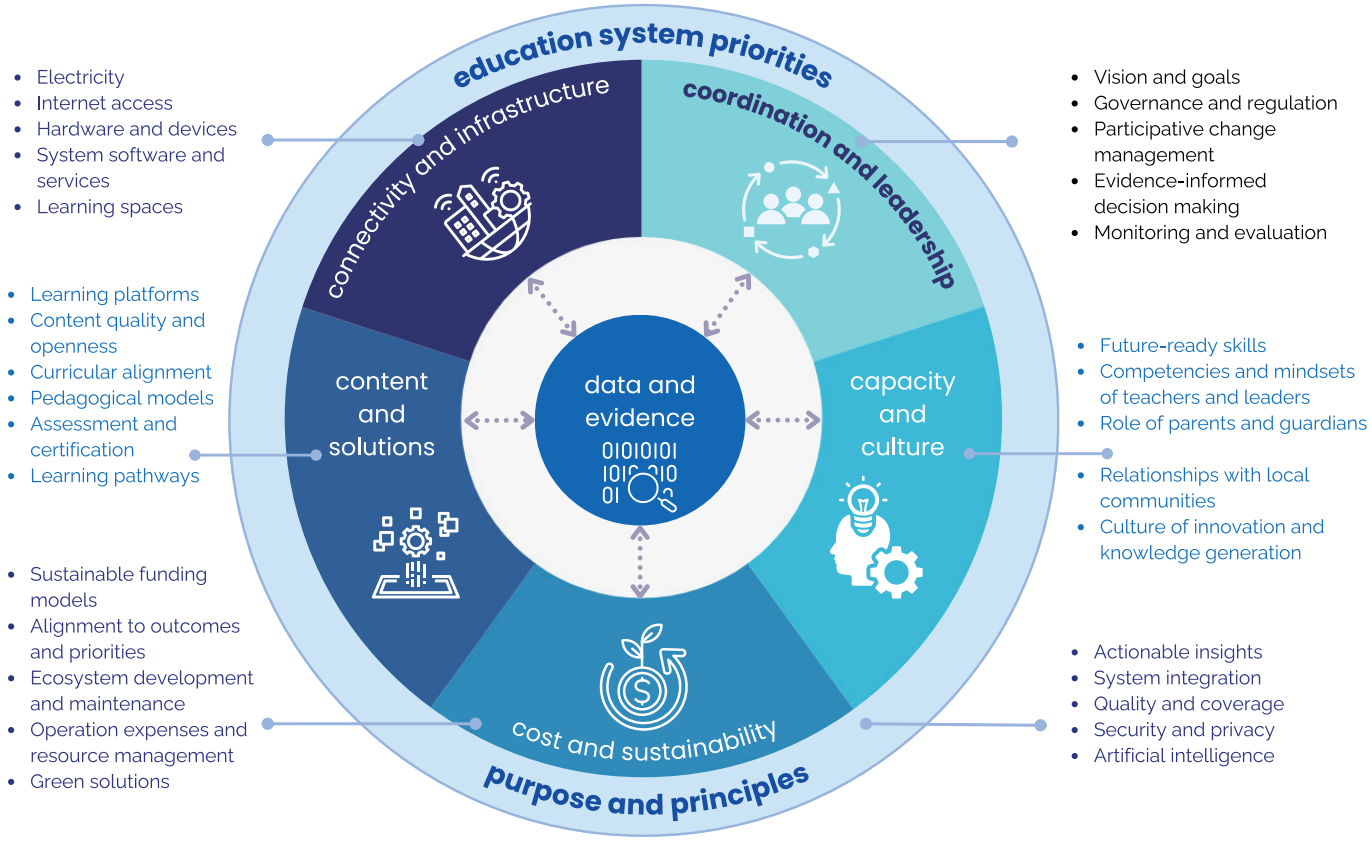
[1] See examples from the World Bank, SIIA and Principles for Digital Development.

Inner layer: Six pillars for the digital transformation of education

At the Transforming Education Summit in 2022, UNESCO, UNICEF and ITU proposed three keys to unlock the potential of digital learning: connectivity, capacity and content. Digital learning is situated within a broader digital ecosystem that requires the addition of three keys to unlock digital transformation in education: coordination and leadership; cost and sustainability; and data and evidence. The framework unpacks each of the core elements of these six pillars to ensure that stakeholders consider all the component parts of a digital transformation journey in education.

"Digital learning is situated within a broader digital ecosystem that requires the addition of three keys to unlock **digital transformation** in education: coordination and leadership; cost and sustainability; and data and evidence."

Figure 1.2 Core elements of the six pillars for the digital transformation of education

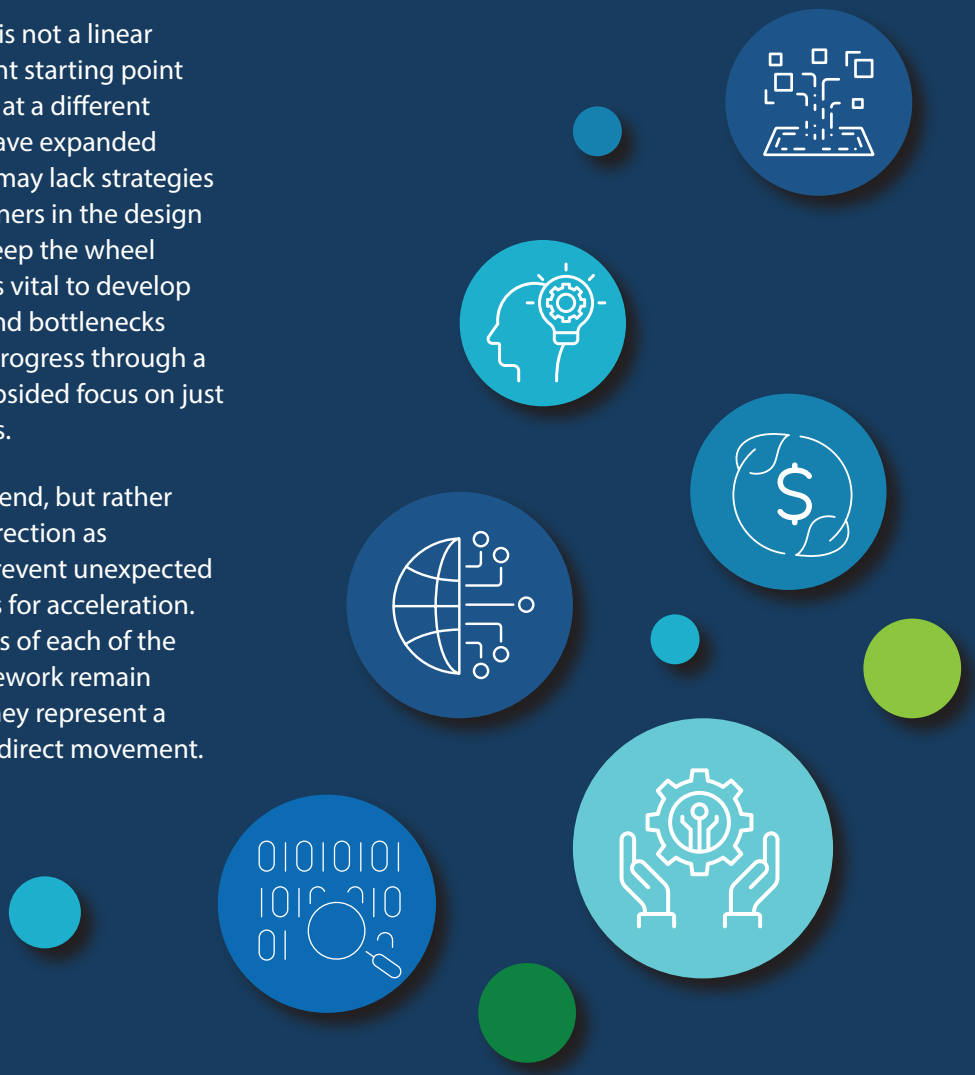


Note. Adapted from the Digital Transformation Collaborative. (2024). https://www.unesco.org/en/global-education-coalition/digital-transformation-collaborative. © UNESCO

Understanding progress within the six pillars

Digital transformation in education is not a linear pathway. Each country has a different starting point within each pillar and may progress at a different pace. For example, a country may have expanded connectivity and device access but may lack strategies to train or include teachers and learners in the design and rollout of digital solutions. To keep the wheel moving towards transformation, it is vital to develop strategies that consider strengths and bottlenecks across all six pillars to ensure even progress through a balanced approach rather than a lopsided focus on just one or several pillars or components.

This pathway does not have a finite end, but rather continues to expand and change direction as technologies evolve, which could prevent unexpected roadblocks or present opportunities for acceleration. Therefore, the following descriptions of each of the pillars and components of the framework remain aspirational rather than absolute. They represent a vision towards which countries can direct movement.



Coordination and leadership

The **coordination and leadership** pillar assesses the effectiveness of governance structures and strategic vision in guiding digital transformation in education. Without strong coordination and leadership, digital transformation initiatives in education risk becoming fragmented, inefficient, costly and less likely to improve learning or advance education goals. This pillar provides the foundational support needed to guide, manage and sustain digital transformation efforts effectively towards educational priorities across levels.

"Governments, the private sector, civil society, the technical community, academia and international and regional organizations, have **roles and responsibilities in advancing an inclusive, open, safe and secure digital future**. Our cooperation will be multistakeholder and harness the contributions of all".

– Global Digital Compact, 2024
(Draft – Revision 3)

Table 2.1. Components of the coordination and leadership pillar

Component	What is it?	Why is it important?
Vision and goals	Establishes a clear, articulated long-term vision and measurable goals for digital transformation in education to align stakeholders around a human-centred, holistic approach to drive strategic, systems-led planning.	Without a unified direction, efforts can become disjointed or misaligned with education goals, creating confusion amongst stakeholders around why and how to leverage technology to improve education processes and experiences.
Governance and regulation	Defines the policy frameworks, legislative measures and organizational structures necessary to support and regulate safe and human rights centered use of digital technologies in education.	Effective governance and regulatory frameworks create a safe, secure and stable environment where digital transformation efforts can thrive, ensuring compliance, transparency and standards-setting across the education system.
Participative change management	Involves engaging diverse stakeholders, including educators, policy-makers, communities, civil society, private sector actors and philanthropies in the planning and implementation process to ensure inclusive and effective digital transformation.	Involving a diverse range of stakeholders, particularly teachers, in the planning and implementation process ensures that the digital transformation is inclusive, equitable and meets the actual needs of all parties involved. This participatory approach fosters ownership and buy-in, which are crucial for successful implementation.

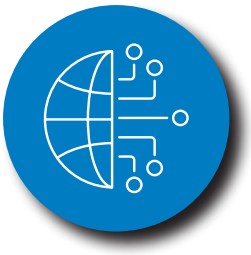
Component	What is it?	Why is it important?
Evidence-informed decision making	Utilizes data and research to guide policy decisions, ensuring that all technology solutions are grounded in the proven ability to safeguard human rights in the digital age and relevant and robust evidence of impact on improving the education challenge they are leveraged to improve.	This approach helps ensure that partnerships with solution providers are cost-effective and their longevity conditional on evidence of social impact. It ensures that resource allocation and procurement are supported by sound evidence to maximize resource optimization.
Monitoring and evaluation	Implements systematic processes to track the progress and impact of digital transformation efforts, enabling continuous improvement and accountability.	Regular assessment and accountability mechanisms help identify what works and what doesn't through feedback loops that enable timely adjustments and scaling of successful strategies.

Recommendations to ensure strong coordination and leadership

01 Develop and implement a clear, comprehensive and adaptive digital transformation strategy with multistakeholder inputs and regular updates.

02 Create and enforce robust policies and governance structures to support and regulate digital education initiatives.

03 Promote a culture of data-informed decision-making and institutionalize continuous improvement processes through training and integrated data systems.



Connectivity and infrastructure

" The foundation of digital education lies in reliable and accessible connectivity and robust infrastructure. Ensuring that all learners and educators have the necessary digital tools and internet access is crucial to bridging the digital divide and fostering an inclusive learning environment."

— RewirEd Global Declaration on Connectivity for Education, 2021

The **connectivity and infrastructure** pillar focuses on the availability, reliability and accessibility of the technical infrastructure required to support digital education. This pillar encompasses electricity, internet access, hardware and devices, digital software and services, and the design of learning spaces, ensuring that all schools are equipped with the necessary resources to facilitate digital learning. Strong connectivity and infrastructure are essential to provide equitable access to educational resources, support digital literacy and enable effective teaching and learning experiences. However, given existing equity gaps in access to connectivity, this pillar also considers online/offline or fully offline alternatives that can facilitate digital learning, such as mobile and low-tech solutions, while countries work towards universal broadband connectivity.

This pillar considers the current state and quality of technical infrastructure in educational institutions; extent to which affordable and meaningful internet coverage is available; access to digital devices and services; and measures taken to ensure safe and secure online/offline digital learning environments. It also explores the efforts to make connectivity and infrastructure more accessible and reliable, particularly in disadvantaged areas. Key components contributing to advancing maturity in this pillar include ensuring reliable and affordable electricity and internet access; providing and maintaining sufficient digital devices and services; and establishing comprehensive IT support and security measures.

Table 2.2. Components of the connectivity and infrastructure pillar

Component	What is it?	Why is it important?
Electricity	Ensures that all educational institutions have reliable and consistent access to affordable electricity, leveraging sustainable energy sources.	Electricity is essential to power digital devices and provide internet access, enabling digital learning and administrative processes.
Internet access	Provides meaningful internet connectivity for all educational institutions and actors to provide users with safe, satisfying, enriching and productive digital learning experiences at an affordable cost.	A meaningful level of internet access is crucial for accessing online resources in learning spaces, distance learning as well as enabling digital communication and collaboration. Low quality connectivity may not yield effective use of online digital solutions for education.

Component	What is it?	Why is it important?
Hardware and devices	Ensures the availability of necessary technical systems (servers, networks), data centres and digital devices (computers, tablets, offline kits) with operating systems and browsers that support digital tools used for education. Considers the use of mobile and low-tech solutions while broadband connectivity expands, leveraging renewable energy infrastructures to improve sustainability.	A robust IT infrastructure ensures the reliability, speed and security of digital systems and software used for education. Digital devices are critical tools for students, educators, administrators and families to engage with digital content and learning platforms. Mobile and low-tech alternatives can provide effective and inclusive access to digital learning solutions. Renewable energy infrastructure supports the sustainability of data centres and other e-services for education.
System software and services	On top of connectivity is a stack of digital public infrastructure (DPI), which provides a secure layer for information sharing and digital identity, utilizing services to protect against cyber threats, ensure data privacy, provide maintenance and performance updates and respond to user support needs.	Modular, interoperable software within an open digital public ecosystem are examples of security-by-design, providing frictionless user services while safeguarding sensitive educational data and providing seamless and secure online and/or blended learning environments for learners, educators and administrators.
Learning spaces	Adapts physical spaces to support digital and blended learning, including storage of equipment, charging stations and mobility of tools for sharing optionality. Ensures access to educational content regardless of connectivity status through online/offline models that leverage low-bandwidth and/or fully offline digital solutions.	Effective learning spaces enhance the learning experience by integrating technology seamlessly into the educational environment, ensuring that learners, educators and administrators even in areas with limited connectivity can access and use digital resources for educational purposes, regardless of bandwidth.

Recommendations to improve connectivity and infrastructure

01

Implement initiatives to provide consistent electricity and high-speed internet access to all educational institutions, particularly in remote and underserved areas.

02

Where relevant, utilize low-bandwidth, online/offline and/or fully offline digital learning solutions to ensure equitable accessibility of digital education for all students, regardless of connectivity.

03

Allocate resources to ensure that all students and educators have access to the necessary digital devices, services and software that enable effective engagement with digital learning materials.

04

Develop and maintain robust digital public infrastructure to support safe, secure and seamless tech-enabled learning environments.

Cost and sustainability

The **cost and sustainability** pillar evaluates the financial aspects of digital transformation, emphasizing sustainable funding models and resource management. This pillar includes assessing the availability of formal budgets for digital education initiatives, alignment of funding to strategic priorities and green solutions for long-term sustainability. Ensuring that digital transformation efforts are financially sustainable through clear, long-term budgeting and planning is crucial to maintain progress and support continuous improvements in education systems. This pillar considers the sources and stability of funding for digital initiatives; the allocation of resources for infrastructure and capacity development; the strategies in place to monitor and evaluate financial effectiveness; and the extent to which environmental sustainability is integrated into fiscal plans for technology procurement, use, maintenance, repair and reuse. Key areas contributing to advancing maturity in this pillar include establishing sustainable funding sources, ensuring equitable distribution of resources, comparing the long-term costs of different options and integrating green solutions and emergency readiness practices into digital transformation efforts.

"We commit to connect all persons to the Internet.

We recognize that this will require strong partnerships and increased financial investments in developing countries from governments and other stakeholders, in particular the private sector."

– Global Digital Compact, 2024
(Draft – Revision 3)

Within this pillar, decision makers should evaluate the total cost of ownership (TCO) for the entire lifecycle of technologies to make informed decisions on the development or procurement of digital solutions, avoid unexpected expenses and maximize circularity. This should include a critical examination of acquisition and operating costs, including purchasing, installation, maintenance, operation, training, technical support, software or hardware upgrades and licensing or subscription fees. It should also consider indirect costs, such as compliance, certification and regulatory costs to ensure that tools meet standards for quality and sustainability as well as emergency costs to provide a financial cushion for ransomware and in the event of cyber security breaches, natural disasters or health emergencies.

Table 2.3. Components of the cost and sustainability pillar

Component	What is it?	Why is it important?
Sustainable funding models	Establishes long-term, diverse sources of funding for digital education initiatives.	Sustainable funding ensures the continuity and expansion of digital transformation efforts, avoiding disruptions due to financial constraints.
Alignment to outcomes and priorities	Develops clear budgets that link spending to educational outcomes and strategic priorities.	Ensures that financial resources are used efficiently and aligned with the overall goals of digital transformation in education.
Ecosystem development and maintenance	Ensures financial resources are allocated equitably across schools and regions.	Ensures that resources are equitably allocated to help bridge the digital divide and ensures all students and educators have access to necessary tools and infrastructure.
Operation expenses and resource management	Implements strategies to maximize the impact of investments in digital education, including through the use of open source software or openly licensed materials.	Ensures that funds are used wisely and considers ways to lower recurring costs or compare long-term costs of different options to achieve the best possible outcomes with available resources, based on TCO evaluations.
Green solutions	Integrates environmental consciousness into decision-making around the procurement and use of technology in education at all levels to promote circularity, longer lifespans and repairable technologies.	Promotes the long-term sustainability of digital education initiatives by reducing the environmental footprint of technology use in education and encouraging environmentally responsible relationships with technology and green-digital citizenship through education.

Recommendations to support cost and sustainability

01

Develop diverse, long-term funding sources and partnerships to ensure continuous support for digital education initiatives.

02

Implement strategies to allocate financial resources fairly across all schools and regions, addressing disparities and promoting equal access to digital tools and infrastructure.

03

Integrate environmentally sustainable practices and technologies in digital transformation efforts to minimize environmental impact and promote long-term sustainability.

Capacity and culture

The **capacity and culture** pillar addresses the digital literacies, competencies and skills of education stakeholders and their attitudes and mindsets towards digital transformation in education and beyond. The meaning of digital competence, literacies and skills may be used distinctly or interchangeably depending on the context, but as a package, they refer broadly to the **capacity** to safely and effectively navigate the digital world on one's own terms. This includes the technical and practical abilities to use digital devices and applications; design and manage digital transformation initiatives in education; and cultivate critical understandings of the social and environmental impacts of digital transformation in education, work and life. **Culture** refers to education actors' perceptions and expectations of the use of digital technologies in education, including the presence of growth mindsets and the propensity for innovation.

This pillar assesses efforts to build system, institutional and individual capacities – including those of educators, learners, parents and caregivers, administrators and community members – to use, create and manage digital technologies in teaching, learning and other educational processes. It explores the integration of digital competencies into curricula and training programmes; the availability of professional development opportunities for leaders and educators at all levels; and the mechanisms to promote knowledge sharing, peer-learning, evidence and research on digital technologies in education. Key components include national frameworks for future-ready digital competencies, the duration of capacity development activities (short-term or long-term), the presence and impact of community outreach programmes and the openness of the current culture to creativity, collaboration, innovation, knowledge exchange and continuous learning.

To fully harness the benefits of digital connectivity, we must **ensure that people can meaningfully and securely use the Internet and safely navigate the digital space.**

– Global Digital Compact, 2024
(Draft – Revision 3)

Table 2.4. Components of the capacity and culture pillar

Component	What is it?	Why is it important?
Future-ready skills	Equips all learners with the digital literacies, competencies and skills needed to participate and prosper in changing societies and economies.	Future-ready skills ensure that learners of all ages can thrive in a technology-driven world by enabling them to navigate the changing needs of workforces and societies while empowering them to harness technologies to shape more just and equitable futures.
Competencies and mindsets	Develops the digital and hybrid pedagogical competencies of teachers and education leaders through pre- and in-service training, continuous professional development opportunities and peer-learning.	Resistance to using technologies in education processes is one of the key barriers preventing the positive social impact of digital transformation in education. Empowering and incentivizing teachers and leaders to understand, practice and share approaches with each other on how to effectively leverage technology to support teaching, learning, family communication and administrative processes is critical to the creation of a culture open to innovation in education with technology.
Role of parents and caregivers	Engages parents and caregivers in supporting safe and effective digital learning by building their awareness of digital tools used in their children's education and their readiness to support behaviors towards digital technology that are conducive to well-being and learning.	Parents and caregivers are responsible for teaching and reinforcing positive behaviors with digital technologies, which means that their digital literacies, including their understanding of digital safety and the impacts of digital tools on well-being, are critical. Family involvement in education can greatly impact learning outcomes and the same is true for digital learning.
Relationships with local communities	Strengthens partnerships with local communities to both provide and participate in digital learning initiatives.	Community relationships foster a supportive environment for digital transformation and leverage local resources and expertise.
Innovation and knowledge generation	Promotes a culture of growth mindsets for continuous improvement, peer-learning, research and the uptake of evidence-informed teaching, learning, administrative, management and governance practices.	Innovation drives educational advancements, ensuring that teaching practices and learning environments remain dynamic and effective, and that administration, management and governance maximize the benefits of new technologies.

Recommendations to strengthen capacity and culture

01

Develop and implement comprehensive curricula and programmes that focus on digital and information literacies, competencies and skills that empower learners to adapt to changing workforce needs and societal shifts as well as to harness technology for just and equitable futures.

02

Provide robust pre- and in-service training and continuous professional development opportunities for teachers and education leaders to effectively integrate technology into teaching, learning and administrative practices, fostering a culture of peer-learning, recognition and positive social impact.

03

Enhance the digital literacy of parents and caregivers through resources and training, promoting behaviors conducive to digital well-being and learning to ensure their involvement positively impacts academic and social experiences and outcomes in education.

04

Foster a culture of learning and growth by strengthening partnerships with local communities to support and participate in digital learning initiatives, promoting continuous improvement, innovation and the adoption of evidence-informed practices in teaching, learning and governance to drive educational advancements and effective technology integration.

Content and solutions

The **content and solutions** pillar examines the quality, openness, accessibility, alignment and relevance of digital learning materials, tools and platforms. It focuses on ensuring that educational content is high-quality, open and inclusive and that platforms used are secure, safe, user-friendly, quality assured and regularly updated. This pillar also addresses the alignment of digital solutions with curricular standards as well as the utilization of digital systems for robust assessment and certification processes. Overall, this pillar describes how digital solutions can tailor learning and teaching pathways to better suit specific learning needs and tech-enabled pedagogical models.

"We commit by 2030 to increase the **availability, accessibility and affordability** of digital technology platforms, services, software and educational curricula in diverse languages and formats."

– Global Digital Compact, 2024
(Draft – Revision 3)

Table 2.5. Components of the content and solutions pillar

Component	What is it?	Why is it important?
Learning platforms	Utilizes digital platforms to develop, deliver, share and manage educational content effectively and inclusively, with a strong emphasis on privacy, security, equity and monitoring of reach and impact.	Effective learning platforms foster personalized, adaptive learning that caters to diverse learner needs. They enhance interaction and collaboration between teachers and learners while empowering users to create, share, and manage high-quality, curriculum-aligned, accessible, and interactive teaching and learning materials.
Application software quality and openness	Ensures that educational application software is open, findable, high-quality, current, controlled, instructive, adaptable and freely accessible.	High-quality and open content promotes equitable access to education and supports diverse learning styles and needs. Openness allows content to be reused, which can contribute to the iterative improvement of its quality and encourage educators' involvement in the development and sharing of digital content.
Curricular alignment	Aligns digital content with nationally and internationally recognized curricular standards, thereby rendering the content useful and usable for educators and learners.	Curricular alignment ensures that digital content is contextually and culturally relevant, appropriate and usable and that it supports the achievement of educational standards and objectives.

Component	What is it?	Why is it important?
Pedagogical models	Integrates digital and blended pedagogical models to empower innovative teaching practices that enhance learning experiences by leveraging technology as a tool for increased engagement, peer learning, differentiated instruction, gamification and support for specific learning needs.	Digital and blended pedagogical approaches can improve engagement and learning outcomes by catering to different teaching and learning preferences and expanding modalities of academic and social interaction, including through the incentivization and recognition of educators who create and share high-quality content.
Assessment and certification	Implements robust assessment and certification processes to evaluate and recognize learning.	Effective assessment and certification validate learning achievements and provide credentials that are recognized and valued.

Actions to establish high-quality content and education solutions

Deploy and maintain user-friendly, free and open digital learning platforms that support personalized learning that caters to diverse learner needs, enhances collaboration between teachers and learners and enables the delivery and management of high-quality, organized, interactive, adaptable and openly accessible educational content that is aligned with national curricular standards, available in relevant languages and accessible for children with disabilities, to support the achievement of educational objectives and promote equitable learning opportunities for all learners.

Support the integration of innovative digital and blended pedagogical approaches that cater to diverse learning preferences, enhance teacher and student engagement as well as empower educators to contribute to the creation, adaptation and development of digital learning resources.

Develop and implement effective assessment and certification systems to evaluate and recognize learning, providing valuable credentials that support structured learning pathways that guide learners through their educational journey while ensuring continuity, progression and recognition of their learning experiences and milestones.

Data and evidence

The **data and evidence pillar** focuses on the services and systems – including Education Management Information Systems (EMIS) and Learning Management Systems (LMS) – for collecting, managing and utilizing a wide range of data types to support evidence-informed education transformation. This pillar refers to the integration of data-informed decision-making in educational planning and management, ensuring that data is accessible and useful for actors at every level – from educators and learners to parents and leaders. It explores the technical architectures of data, including the foundational layer of DPI that allows for secure and seamless data exchange to enhance the comprehensiveness, timeliness, accuracy and multi-source interoperability of data systems. It refers to data used in a variety of education processes, including evidence-based decision-making, resource optimization, predictive analytics, tailoring educational experiences, continuous monitoring and research. Central to this pillar is the idea that data and evidence should facilitate collaboration across educators, learners, parents and leaders at all levels, and it should be used in continuous improvement cycles to enhance system efficiency and effectiveness, refining educational strategies and policies related to digital transformation and beyond.

"We commit by 2030 to develop, disseminate and maintain, through multistakeholder cooperation, **safe and secure open-source software, platforms, data, AI systems and standards** that benefit society as a whole.

We consider that safe and secure data systems and capacity are critical for **evidence-based policy making** and the delivery of public services."

– Global Digital Compact, 2024
(Draft – Revision 3)

Where is AI in the framework?

AI is housed within the data and evidence pillar because AI and Generative AI technologies cannot exist without data. The placement of AI within this central pillar with bidirectional arrows is intentional.

The arrows pointing out indicate that data and AI impact all pillars, from capacity development programmes and costing simulations to teaching and learning processes. The arrows pointing inward indicate that the process of digital transformation in education will itself lead to the production of better and more comprehensive education data and AI applications, which can then feed back into planning for teaching, learning, administration, management and governance processes.

Generative AI used in education should be grounded in quality-assured education data, further emphasizing the bidirectionality of the process as high-quality, controlled, digitized education data and content can feed high-quality, controlled applications of AI in education that are fit-for-purpose, ethical and trustworthy.

Table 2.6. Components of the data and evidence pillar

Component	What is it?	Why is it important?
Actionable insights	Utilizes data analysis to generate practical and tailored recommendations to improve educational experiences for education actors at all levels.	Actionable insights for educators, learners, parents and leaders enable meaningful support for teaching, learning and the development of interventions and policies that directly address identified challenges and opportunities.
System integration	Ensures that various data systems within and outside the education sector are interconnected and interoperable for seamless, secure data flows that enable digital service delivery in education.	Integrated, interoperable data systems provide a comprehensive view of the education landscape, enhancing decision-making and operational efficiency through modular digital service design elements that feed into a foundation DPI architecture for different educational users and purposes.
Quality and coverage	Implements standardized methodologies to ensure data is accurate, reliable and comprehensive.	High-quality, reliable and comprehensive data is essential for generating accurate insights and making informed decisions.
Security and privacy	Establishes measures to protect data from unauthorized access and breaches while ensuring privacy.	Ensuring data security and privacy builds trust among stakeholders and complies with legal and ethical standards.
Artificial Intelligence	Assesses the benefits and risks of integrating AI technologies and automation into education processes.	If leveraged ethically and purposefully, AI can illuminate trends, automate data processing and offer tailored educational solutions, enhancing overall efficiency and effectiveness in certain education processes.

Actions to leverage data and evidence for education transformation

01 Ensure that educational data is accurate, reliable, secure and comprehensive to promote data use and service provision using data across all levels, including the school level, and to support the design and development of responsible and ethical AI models for education.

02 Design and maintain interoperable data systems to enable data sharing and accessibility across different platforms, implementing stringent data protection measures to safeguard educational data against unauthorized access and breaches to ensure compliance with privacy laws.

03 Foster a culture of data-informed decision-making by training educators, administrators and education leaders in data analysis and utilization to integrate insights into policy and practice, and ensure data is visually presented in appropriate ways to facilitate interpretation and analysis.

04 Demand and generate evidence on the social impact of technologies used in education by cultivating links between researchers, developers and education decision-makers to build trust and transparency, support efforts for testing education technologies and establish standards for compliance in data and information sharing.

Why and how to use the framework

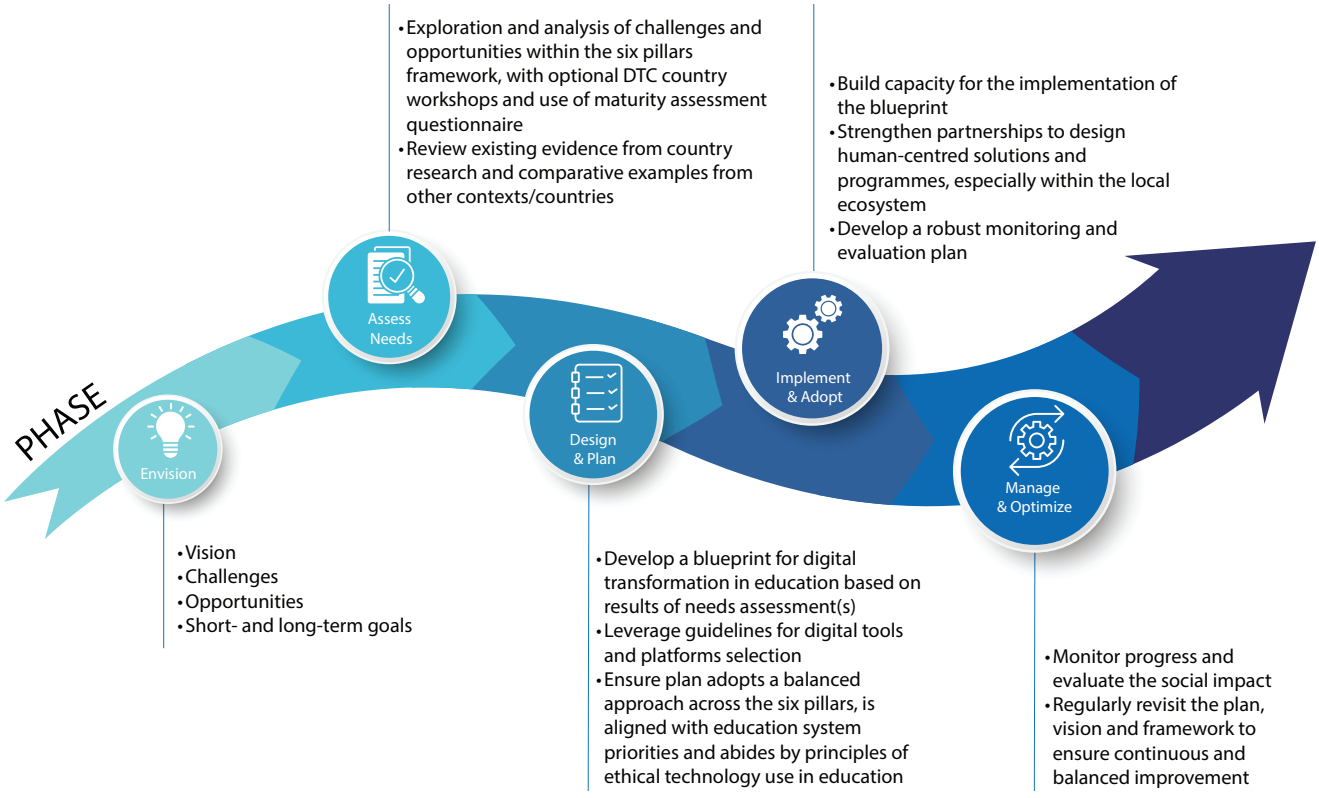
The framework can be used to develop policies, strategies and plans for digital transformation in education. It is accompanied by a maturity assessment tool in three stages (emerging, progressing, transforming) for countries to self-assess or mobilize the DTC to support this exercise. The assessment tool provides a macro-level understanding of the digital transformation landscape in education, helping to form strategic visions and align stakeholders around digital transformation goals while highlighting general areas of strength and opportunities for improvement across the education system.

The **DTC envisions a digital transformation journey in five phases**, as illustrated in figure 3.1 below. Although DTC partners can be mobilized across all stages, the alliance proposes concrete collaborative actions in the first three phases through analysis workshops and support for strategy development.[2]

Who benefits from using the framework

All countries, stakeholders and education actors at any level can use the framework and adapt it to their contexts. Ideally, the framework would be adapted and adopted by a core digital transformation team that brings diverse perspectives to education digital transformation envisioning and planning. This core team then coordinates with other stakeholders in the technology ecosystem. Agreeing on a common framework facilitates the alignment of local efforts with global standards and initiatives. This global-local alignment is crucial for accessing international support, funding and partnerships as well as ensuring that the education system meets its own national benchmarks and contributes to international educational goals.

Figure 3.1 DTC phases of a digital transformation journey in education



[2] For further information on the DTC, visit the dedicated UNESCO webpage. If you are a country or partner who would like to engage with the alliance, please email globaledcoalition@unesco.org.

Annex: Policy Resources

Guides, reports, toolkits and briefs

Global Education Monitoring Report: *Technology in education: A tool on whose terms? (2023)*. The 2023 *Global Education Monitoring Report* tackles the divisions surrounding technology's role in education, exploring its potential solutions to education challenges while recognizing that proposed solutions may also pose risks.

Global Education Monitoring Report: *Youth report 2024: technology in education: a tool on our terms! (2024*. The 2024 Youth Report on technology in education is the result of an extensive consultation process involving +1500 youth and students across 8 regions. The consultations invited participants to reflect on the key challenges and opportunities for the use of technology in education in their regions through the lenses of the recommendations in the global 2023 Global Education Monitoring Report.

UNESCO: AI Competency Framework for Teachers (2024). The AI competency framework for teachers defines the knowledge, skills, and values teachers must master in the age of AI. Developed with principles of protecting teachers' rights, enhancing human agency, and promoting sustainability, the publication outlines 15 competencies across five dimensions: Human-centred mindset, Ethics of AI, AI foundations and applications, AI pedagogy, and AI for professional learning. These competencies are categorized into three progression levels: Acquire, Deepen, and Create.

UNESCO: AI Competency Framework for Students (2024). The UNESCO AI competency framework for students aims to help educators in integrating AI learning objectives into official school curricula, outlining 12 competencies across four dimensions: Human-centred mindset, Ethics of AI, AI techniques and applications, and AI system design. These competencies span three progression levels: Understand, Apply, and Create. The framework details curricular goals and domain-specific pedagogical methodologies.

UNESCO: *Recommendation on the Ethics of Artificial Intelligence* (2021). The first-ever global standard on the ethics of artificial intelligence defines values, principles and policies that will guide countries in building legal frameworks to ensure that AI is deployed as a force for the common good.

UNESCO: *Guidelines for ICT in education policies and masterplans* (2022). This publication proposes policy planning frameworks and an iterative roadmap to examine the digital readiness of local education systems, assess needs of learners and teachers, and plan well-resourced national ICT in education programmes. This is followed by a deep dive into examples of national masterplans on the use of ICT in different types of education.

UNICEF: *Pulse Check on Digital Learning (2022)*. This report takes the pulse of five vital elements for effective digital learning, and is part of UNICEF's larger efforts to provide quality, personalized and safe learning experiences to all children, ensure learning and skills development, close the digital divide and spearhead innovative and scalable solutions to educational challenges.

UNICEF: *Operational Guide for Monitoring Hybrid Learning Delivery Toward Long-Term System Strengthening and Resilient Education Systems* (2022). This manual and corresponding guidebook have been developed in line with UNICEF's commitment to support Ministries of Education and education decision-makers to effectively monitor the status and implementation of education delivery and learning, including in emergency situations.

UNICEF and UNESCO: *Monitoring Education Participation: Framework for monitoring children and adolescents who are out of school or at risk of dropping out* (2016) The purpose of this guidance is to equip and inspire decision-makers and practitioners working in the field of education to improve the data on education participation and exclusion, and the response interventions to ensure that all children are in school and learning.

ITU: *Universal Service Financing Efficiency Toolkit* (2022). The toolkit provides analytical tools, examples and templates that are grounded in practical experience and designed to help policymakers, regulators and universal service fund administrators to navigate common questions and challenges they face when using public funds to design, implement and finance programmes and projects that facilitate access to digital technologies and communication infrastructure.

ITU: *Digital Skills Assessment Guidebook* (2020). This document is a practical guide to help countries conduct national assessments of their digital skills. The aim is to assess their current digital skill levels and identify future digital skill requirements.

UNESCO: *AI and education: guidance for policy-makers* (2021). This publication offers guidance for policy-makers on how best to leverage the opportunities and address the risks presented by the growing connection between AI and education.

UNICEF: *On Call: Using Mobile Phones to Provide Learning in Emergencies* (2022). This report outlines in detail how mobile phones can be used as a learning tool in emergency settings. It also provides practical case studies and references for how mobile phones have been used to teach students, support parents and train teachers.

ITU: *Last-mile Internet Connectivity Solutions Guide* (2020). This publication consists of guidelines that can help policy-makers and professionals select and customize appropriate last-mile connectivity solutions. The guide is part of a broader Last-mile Connectivity Toolkit that aims to drive new collaborative strategies to extend connectivity to those at the bottom of the social pyramid and to enable key stakeholders to take a more holistic approach that treats broadband as a basic public utility and core tool for socio-economic development.

ProFuturo: *Learning and Teaching in the Digital Era: Reference Frameworks* (2020). The purpose of the Global Framework of Competence for Learning in the Digital Age and the Global Framework of Competence for Education in the Digital Age is to establish a holistic approach to the two most relevant processes for individuals and societies in the 21st century, with the aim of providing a tool to analyze both learning and education for the individual and collective improvement of both processes.

World Bank: *EdTech Toolkit for Remote Learning* (2022). This publication aims to support policy-makers and researchers in the planning and medium- to long- term design of multi-faceted remote/hybrid learning strategies in low-resource environments through the creation of the following global public goods: 7 Resource Packs WB-UNICEF co-branded on radio, printed materials, television, digital tools, mobile and formative assessment; and 16 knowledge packs published on key delivery technologies, such as radio, TV, mobile, remote learning, innovation ecosystems as well as digital content, LMS, technologies for personalized and adaptive learning, assistive tech, literacy, EMIS 2.0, devices, cloud, remote formative assessment, procurement and teachers' skills for remote learning.

Microsoft: *K-12 Education Transformation Framework Quick Start Guide* (2021). The Microsoft Education Transformation Framework is a guide for education leaders to navigate the complexity of transformation impacting every aspect of their mission. It facilitates the process of envisioning what's possible and developing a strategy to achieve it.

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Six pillars

for the digital transformation of education

The education sector stands to benefit from the innovative possibilities afforded by technology, and yet equity and quality have not steered digital transformation in education. Developed as a contribution to the 2024 Global Digital Compact by experts of the Digital Transformation Collaborative – a multistakeholder alliance within UNESCO's Global Education Coalition – the six pillars framework provides a common, comprehensive language for shaping a more sustainable, human-centred and balanced approach to leveraging technology to achieve education system goals and ensure that education remains a public good.

From change management and sustainable funding models to digital learning platforms and artificial intelligence, the framework encompasses a diverse digital ecosystem that implicates policy-makers, education professionals and providers of services and solutions in the design and delivery of strategies and initiatives based on the essential components of digital transformation in education from a systems perspective.

This document encourages all education actors to use the six pillars to foster cooperation across sectors and partners and to support education leaders across all contexts to strategize, self-assess, plan meaningful activities and navigate new developments, emerging technologies and evolving educational needs.

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