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Future Competences and the Future of Curriculum

A Global Reference for Curricula Transformation

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INTERNATIONAL BUREAU OF EDUCATION

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This is the second of a series of normative documents that are to guide the future of curriculum. Through Document 2, the IBE offers a global normative guide for competence-based curricula that can support the attainment of the Education 2030 agenda, and that can prepare learners (young and old) for Industry 4.0. It defines competence, it outlines markers of competence-based curricula, and it presents a framework of competences to serve as a global reference point for future curricula transformations. It articulates future competences and the future of curriculum, and proposes an institutional mechanism for keeping competences current.

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Contents

Executive Summary

This is the second document of a series of normative documents that are to guide the future of curriculum. Document 1 presented a paradigm shift that reconceptualizes curriculum along eight dimensions. It spells out the repositioning of curriculum implied in some of the eight dimensions. Document 1 also underscored the reality that the global Education 2030 Agenda will mostly be implemented within Industry 4.0, and this implementation context can hardly be ignored.

Document 2 operationalizes the first of the eight dimensions presented in Document 1, which recognizes *curriculum as the first operational tool for ensuring the sustained development-relevance of education and learning systems*. It argues that accepting this dimension compels the repositioning of curriculum at the center of national and global development dialogue and agendas. It further notes that to support development, curricula must enable learners (young and old) to acquire competences for effective uptake of opportunities and for effective addressing of challenges across fast changing, and sometimes disruptive 21st-century development contexts. Industry 4.0 is fully acknowledged as a formidable accelerant of change and complexity in the 21st century, and as having significant implications for curricula.

Accepting the first dimension for reconceptualizing curriculum also demands the adoption of competence-based curricula as most appropriate for equipping learners (young and old) with competences for optimal contribution to development in the 21st century in general, and in Industry 4.0 in particular. The reorientation of future curricula toward competence-based approaches has already gained momentum. This is evident in the number of countries that have been, or are in the process of this reorientation. The IBE is inundated with country requests for technical support to reorient their curricula toward competence-based approaches. There has also been an exponential growth in articulations of frameworks for competence-based curricula and lists of future competences. A fair sample of these is reviewed in this Document.

While appreciative of these burgeoning efforts, Document 2 cautions of the potential confusion emerging from these initiatives. There are varying, and sometimes contradictory, understandings of competence, and of competence-based curricula. There is a fair amount of confusion between competence and its constituent parts. Different entities offer diverse lists of "competences" for inclusion in curricula, which actually turn out to be a mix of competences and their constituent elements. The lists are often presented as current but most often without mechanisms for keeping them current, despite the fact that they are motivated by the need to respond to rapidly changing 21st-century contexts. The lists of competences are often offered with sparse, if any, advice on how to implement them, and how to ensure their impact. Concepts remain unclear and undifferentiated, with the same labels used to denote different things and vice versa. There is therefore need for normative instruments that regularize dialogue and initiatives in the field, and that safeguard the integrity of technical assistance offered to countries. As a global Center of Excellence in Curriculum and related matters, this is the role of the IBE, and this is what this series of Documents seeks to do.

Through Document 2, the IBE offers a global normative guide for competence-based curricula that can support the attainment of the Education 2030 Agenda, and that can prepare learners (young and old) for Industry 4.0. It defines competence, it outlines markers of competence-based curricula, and it presents a framework of competences to serve as a global reference point for future curricula transformations. It articulates future competences and the future of curriculum, and proposes an institutional mechanism for keeping competences current.

The normative guide herein presented benefitted from a critical review of existing efforts, consultations with thought leaders in the field, consultations with heads of curriculum across UNESCO Member States, and the IBE's own expertise and experience. This Document is followed by Document 3, which focuses on the transformation of teaching, learning, and assessment to suit competence-based curricula; and Document 4, which speaks on the creation of enabling systemic environments for effective implementation of competence-based curricula.

Introduction

The relevance of education and learning to holistic, inclusive, just, and sustainable development (hereafter referred to as development) is universally accepted. It is also universally acknowledged that education and learning produce the human resources, and facilitate long term human capital accumulation required to steer development. Evidence of the perceived role of education and learning is in instruments that guide national development such as: constitutions, national visions statements, national development plans, poverty reduction strategies, country investment climate assessments and reports, private sector development strategies, education sector policies, other sector policies, etc. The evidence is also in global instruments such as Global Competitiveness Reports, Knowledge Economy Indexes, Human Development Reports and Indexes, and in Internationally Agreed Goals (IAGs) such as the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs).

The symbiotic and iterative relationship between education and development is also universally acknowledged. Education inextricably supports development. At the same time, the development of education itself depends on overall development. For instance, development provides the resources required to further develop education and learning systems. Healthy development contexts continuously gen-

erate new challenges to which education and learning systems must respond. Furthermore, they continuously change the types, levels, and mix of competences required by individuals, societies, countries, and the world. Changing demands for competences directly impact education and learning systems as they must produce graduates with such competences. For instance, the heightening awareness of the need for sustainable development spurred demand for green skills; the technology revolution gave rise to digital skills, changes in workplaces created new skills for employability and for work; and, globalization impelled competences for global citizenship.

The acknowledged role of education in development was dramatically accentuated by the emergence of knowledge based economies (KBEs) where development became even more recognized as driven by the application of knowledge and technology savvy, the acquisition of which depends on education and learning. The fast pace of change in the 21st century, and further acceleration by Industry 4.0 dramatically amplify the pertinence of education as a key source of lifelong learning, adaptability, agility to adapt, and resilience. More than just the velocity of change, Industry 4.0 is intensifying the complexity of development contexts. Advanced technologies permeate not just industry but all aspects of daily life across the physical, digital, biological, humanistic, security, and ethical domains. There is heightening integration of the physical with the virtual, interfacing of humans with machines, and there are intelligent machines that communicate and that can interact with their environments. Within Industry 4.0, the information revolution is taking a new dimension, thanks to unlimited storage, high velocity of data processing, high speed transmission through and across high performing computers and intelligent objects that are interconnected through the Internet. Industry 4.0 also brings into sharp focus the interface between technology and humanistic, ethical, and security concerns among others. Combined, these factors raise demand for a wider range of multifaceted, transdisciplinary, and integrated competences for which many education and learning systems are yet to be ready.

While policies on the development-relevance of education and learning are universal, there is far less consensus on specific and concrete tools for giving effect to such policies. Not surprisingly, deepening awareness of the role of education and learning in development often co-exists with increasing frustration with the irrelevance of education and learning. More often than not, education and learning systems are seen as failing to produce graduates with competences required to meet challenges and to take up opportunities offered by fast changing contexts of the 21st century. Education and learning systems are perceived as failing to keep up with the pace of change, let alone leading the change. Evidence includes the perceived alienation of graduates from their cultures, poor mastery of national languages, functional illiteracy, poor civic responsibility, poor employability,

lack of digital skills required in labor markets, escalating intolerance and violence, etc. Evidence is also in the co-existence of "the educated unemployed" with unmet demand for skills, especially in dual economies. The gap between education and learning systems and their development contexts will exponentially widen as the impact of Industry 4.0 begin to set in.

A Case for Competence-based Curricula

Curricula have enormous capacity to narrow the gap between education and learning systems on the one hand, and their development contexts on the other. Quality curricula are linchpins of the development-relevance of education and learning systems. However, as the IBE recently noted (Marope, 2017), current conceptualizations and positioning of curriculum constrain this potential. To unleash this potential, the IBE presented a paradigm shift that reconceptualizes and repositions curriculum (ibid). It reconceptualizes curriculum along eight dimensions, the first of which recognizes it as *the first operational tool for ensuring the sustained development-relevance[1] of education and learning systems.* The IBE argues that accepting this dimension demands the repositioning of curriculum at the center of national and global development dialogue and agendas. It also necessitates a change in curricula development processes to better anchor them in their development contexts. These contexts are complex and multidimensional, including individual, societal, national, regional, global, temporal, and sectoral dimensions. Curricula development processes should be underpinned by a textured understanding of contexts that curricula should respond to, as well as change for the better. Such an understanding is what should inform the selection of competences to be reflected in curricula.

1 Document 1 also proffered a concept of development that goes well beyond the economistic view that dominated the 20th and even the early 21st century. This concept of development is used across all Documents in the series.

Accepting the first dimension for the reconceptualization of curriculum therefore compels the adoption of a competence-based approach to curriculum. It is through the curriculum that societies identify and package required competences into relevant and fulfilling learning experiences for children, youth, and adults. As education systems realize the power of curriculum as a tool for development-relevance, efforts to reorient curricula toward competence-based approaches have gained momentum. An escalating number of countries have undertaken or are in the process of curricula reforms toward competence-based approaches.

For both developed and developing countries, quality curricula are those that enable learners (young and old) to develop competences for meeting challenges and taking up opportunities in fast 21st century waves of change; the most immediate of which is Industry 4.0. Sustaining development-relevance in the face of constant and rapid change requires curricula to be lifelong learning systems in their own right, capable of constant self-renewal and innovation (Marope, 2017). Otherwise, curricula risk equipping learners with obsolete competences that are suitable for the past, further disconnecting them from their current and future contexts. For any country, staying behind is not an option. It is a real constraint to the capacity of that country to optimally use their education and learning systems as levers of holistic, equitable, just, and sustainable development. This has serious implications for the attainment of SDGs; for national development and competiveness; for equity, inclusion, and justice; and for peace at both national and global levels.

Curricula are not only about change, they are also about stability. Most particularly, the stability of core functions of education such as the facilitation of foundational/enabling competences like basic literacy, knowing how to learn, and mastery of fundamental disciplines like language, sciences, and mathematics. Curricula reforms must mitigate the risk of crowding out these core functions even through education and learning systems' efforts to be responsive. They must strike a delicate balance between change and stability.

Current skills/competence frameworks

Recognizing the power of curricula in fostering the development-relevance of education and learning systems, the turn of the century witnessed exponential growth in efforts to articulate competences/skills considered relevant to emerging contexts. The most cited of these contexts are: constant changes in the 21st century in general, the transition to knowledge-based economies, the information and technology revolution, the digital workplace, changes in labor market demands, and the emergence of violent extremism. The onset of Industry 4.0 will only further motivate more lists and competence frameworks.

Contributors to the list of competences/skills considered necessary to include in curricula have mainly been partnerships between the private sector and non-governmental entities such as academic and technical institutions. Other contributions came from the private sector/industry forums such as the World Economic Forum, developed countries, and multilateral agencies such as UNESCO, the EC, and the OECD. These contributions are detailed in Annex 1.

An analysis of current contributions show that although there are substantial variations, most agree that competence is far more complex than skill, and that it comprises knowledge, skills, values, and attitudes. There is also a fair measure of consensus on discrete "skills and/or competences" considered essential for inclusion in curricula.

The most recurring examples include:

– Creativity, communication, critical thinking, problem solving, curiosity, metacognition;
– Digital, technology, and ICTs skills;
– Basic, media, information, financial, scientific literacies and numeracy,
– Cross-cultural skills, leadership, global awareness;
– Initiative, self-direction, perseverance, responsibility, accountability, adaptability; and
– Knowledge of disciplines, STEM mindset.

Key challenges

Existing contributions provide a rich base on which to build a normative and more futuristic competence framework to guide the future of curriculum. At the same time, they reflect significant challenges that a global normative instrument must avoid. Key among these are:

– *Poor differentiation between competence and its constituent elements:* Many contributors agree that a competence is a complex construct, comprising knowledge, skills, attitudes, values, etc. But in the actual listing of the competences, they mix competences with their constituent elements.
– *Lack of a common language and common concepts:* Across current lists, terms like competences, attributes, capabilities, and skills tend to be interchangeably used in reference to different constructs.
– *Lack of a common starting point:* Different lists are generated in reference to different starting point such as: skills for the 21st century, digital workplaces, information societies, STEM, GCED, and economic blocks like the EC. Countries looking for resources to guide their curricula reforms have to choose from these variously motivated lists. What is lacking is a neutral or generic supra level framework of future competences that countries can use as a reference point and that is easy to adapt to their contexts.

- *Varied taxonomies:* The categorization of competences is very diverse, and this again leaves countries without a common reference point to use.
- *Lack of evident interaction across elements of competences:* In real operational terms, elements of a competence (knowledge, skill, technology savvy, etc.) interactively and iteratively work together to demonstrate competence. A presentation that makes this interactive nature vivid would go a long way in clearing the current confusion.
- *Unclear standards and developmental progression:* Competences are not always expressed in terms of standards and levels of progression that can guide curriculum design, development, sequencing, and vertical articulation. Such a presentation may be useful to practitioners.
- *Lack of consensus on the structure of curricula:* While there is consensus on the need to transition to competence-based curricula, views on the structure of curricula remain divergent between the maintenance of traditional subjects and learning areas interwoven with competences, and the more radical view that curricula should be restructured around competences. Each view has implications for systems transitioning to a competence-based approach and these need to be articulated.
- *Lack of mechanism to ensure sustained currency:* With a few exceptions (OECD, EC, countries) some lists are generated under projects with no mechanisms for a continuous revisit that ensures currency. Yet, they all start with an aim to respond to fast changing contextual demands. Lack of mechanisms for sustained currency exposes these lists to the risk of becoming obsolete. Work on future competences needs to be supported by clear institutional mechanisms for sustaining currency.
- *Lack of mechanism for global ownership:* As stated, most efforts take an institutional, national, or regional perspective. Still lacking is a global normative contribution which most, if not all countries can endorse. This is the role of IBE-UNESCO, given its near global coverage of 195 countries and 12 observer countries, its mandate, and its convening power.
- *Risk of divergent technical advice:* For countries that need and receive technical support from multiple agencies, the lack of consensus may leave them with contradictory approaches to select from, rather than a generic approach they can adapt to their context. This may be overwhelming, especially for countries with limited technical capacities. As it works at the supra level or global level of curriculum development, the IBE has the mandate to provide a generic approach that countries can adapt to their contexts.
- *Feasibility of implementation:* Adopting a competence-based approach has substantial implications for the implementation capacity of education and learning systems. Current contributions do not always identify key enablers required for effective implementation. Without explicit support for implementation, many countries, especially those requiring a lot of technical support will have "official" competence-based curricula that are not taught, learned, or assessed. Document 4 of this series addresses this issue.
- *Managing the transition:* The transition from subject-based to competence-based curricula requires careful management. Yet, more often than not, countries are without guidance on how to start and, most importantly, how to proceed through this complicated transition.
- *Weak or unshared tracking of impact:* More often than not, education systems, including curricula sub systems, are resistant to change. Evidence of the impact of proposed changes is therefore vital to convince those in charge. Currently, there is no systematic collection of evidence of impact of competence-based approaches, and even less dissemination of this impact at the global level. Setting up such mechanisms would be invaluable.
- *Limited platforms for global policy impact:* Perhaps related to the limited sharing of impact, current contributions to future competences have not always found an easy way to influence curricula policies and practices at a global level. A mechanism is therefore needed to enable this impact.

In summary, the private sector, countries, regional and economic blocks, and multilateral agencies continue to make invaluable contributions to dialogue and initiative on competence frameworks. However, the world still lacks a *global normative instrument* that can be used as a global reference point for curricula transformation. It lacks *an institutional mechanism with adequate anticipatory and foresight capacity to ensure sustained currency and relevance of proposed competences.* There is also need for more generic, normative technical advice on future competences and the future of curriculum that can be adapted to diverse contexts. Given the multiple agencies that countries may call on for technical advice, there is also need for *consistency of language, concept, construct, and content that allow for specific contextual adaptability.*

Toward a Global Reference Point on Future Competences

Defining Competence

Competence is herein defined as *the developmental capacity to interactively mobilize and ethically use information, data, knowledge, skills, values, attitudes, and technology to engage effectively and act across diverse 21st century contexts to attain individual, collective, and global good.*

This definition recognizes that it is no longer sufficient to enable learners to acquire discrete knowledge, skills, values, etc. It is critical that learners can intelligently make connections across elements of a competence, integrate, and interactively apply them to respond to contextual demands as well as to change their contexts. What learners learn is necessary but no longer sufficient. What is most critical is how they can apply what they learned across fast-changing, unpredictable, and even disruptive contexts of the 21st century in general, and Industry 4.0 in particular. It is whether learners can use what they have learned to demonstrate adaptability, agility to adapt, and resilience. In sum, future curricula have to reflect competences that prepare learners for an unknown future. That is what makes them futuristic.

Distinguishing Attributes of a Competence-based Curriculum

Contextual grounding: A competence-based curriculum is grounded in the understanding of the demands of the learners' context. An analysis

of context is an indispensable first step in the development of competence-based curriculum. Context is complex, multidimensional, and diverse. At any point in time, one functions across a range of contexts of varying types and levels. Each context places different demands on individuals and collectives. The 21st century and particularly Industry 4.0 present challenges and opportunities for which learners must be prepared. The challenge is for curricula to equip learners with competences that enable them to adapt to and effectively meet these challenges, as well as to take up and create opportunities that bring to bear individual, collective, and global good/benefit.

In contrast to competence-based curricula, subject-based curricula are mostly grounded in an understanding of the subject matter content or the disciplines. They generally prepare learners to know the subject matters and to gain a deep understanding of advancements in the field. They don't necessarily emphasize immediate use of acquired knowledge. The application is often deferred to real life situations that learners may confront later in life, forcing them to apply what they had learned. Because of insensitivity to context, it is often easy to have the same curriculum across different contexts, mostly borrowed from what are considered to be advanced contexts. The risk of irrelevance of the curriculum is also higher.

A key consideration is how best to facilitate curriculum specialists to gain an in-depth understanding of the learners' current and future contexts, and how to identify competences, which should be reflected in curricula.

Learner centeredness: This requires the structuring of learning environments that motivates the learners' acquisition and use of competences. Educators are challenged to create diverse learning environments as lifelike contexts within which learners can demonstrate their competences.

Emphasis on evident use of competence: Competence-based curricula emphasize the ability to use what is learned. Acquisition is important but not sufficient. It equally matters what learners are able to do with what they have acquired. Subject-based curricula do not always have the same emphasis on usage.

A key consideration is what needs to be done to enable teachers to arrange learning contexts in a manner that enables learners to actually use what they are learning and/or have learned.

Emphasis on outcomes or impact: The application of competence is not an end in itself. The end is the targeted outcome, or the desired impact such as: productivity, efficiency, fulfilment, enjoyment of life, sustainability, etc. A much deeper meaning of relevance lies beyond the ability to use what is learnt to the "so what" of its usage.

A key consideration is how to support educators to reach for the deeper impact of learning, and how to assess it.

Emphasis on trans-disciplinarity: Any single competence (e.g., problem solving) can be acquired through a range of disciplines or subject matters (logic, ethics, science, mathematics, politics, etc.), competence-based curricula are necessarily multidisciplinary. This is in contrast to subject-based curricula where at worst subjects are taught as single disciplines and at best as broad-fields.

Especially at the post-primary level, a key consideration is how to enable educators to master their specific disciplines, and at the same time, to have adequate knowledge of other disciplines enough to make transdisciplinary linkages. Another challenge is how to design curricula in a way that makes linkages across subjects and learning areas.

Careful consideration of curriculum structure and sequence: Competence-based curricula are structured around competences and not around subjects, and progression relates to the competence rather than subject matter difficulty. Subject matters are used as instruments through which competence acquisition can be facilitated, not as content to be mastered by learners as an end in itself.

High mastery of content: As the last word, competence-based curricula are not against subject matter content. Effective application of content across disciplines actually requires a high level of mastery of the content.

A Global Reference Framework on Future Competences

Figure 1 presents the framework for global reference on future competences, which depicts the espoused definition of competence. In the first panel, the constituent elements of competence are depicted as interactive.

In the second panel, constituent elements interact to produce seven macro competences that are considered relevant across contexts. These are: (i) Lifelong learning; (ii) Self-agency; (iii) Interactively using diverse tools and resources; (iv) Interacting with others; (v) Interacting with the world; (vi) Multi-literateness; and (vii) Trans-disciplinarity. Because of their universality, macro competences are quite stable. They allow for curricula stability across transformations and reforms. They are the bigger picture and the overarching "why" of a curriculum.

Within the 21st century and Industry 4.0, education systems must prepare people for:

Lifelong learning: Knowing how to learn is the most critical future competence. What is learned remains important, but in fast-changing contexts, it quickly becomes obsolete or it is forgotten. Knowing how to learn affords people the regenerative capacity to reinvent themselves for changing contextual demands. It is the source of currency, innovation, adaptability, agility, and resilience.

Self-agency: The 21ˢᵗ century requires people to be self-actualized agents. This demands capacity and empowerment to analyze the demands of one's environment and apply all resources at hand (knowledge, skills, technologies, etc.) to take self-benefitting and self-fulfilling action. Self-agency is about confidence and facility to face the known and the unknown, and to emerge accomplished and fulfilled.

Interactively using diverse tools and resources: Increasing complexity also demands effective, efficient, and interactive use of a range of tools and resources relevant for the task at hand. These tools and resources go beyond the constituent elements of competence to include intellectual, cultural, religious, linguistic, material, technical, fiscal, physical, and virtual resources, the interface of the self and machines in smart factories of Industry 4.0, the use of multiple technologies, of time, etc. Responsible use of tools and resources is also at the heart of responsible consumption and sustainable lifestyles, which contribute to sustainable development.

Interacting with others: Increasing complexity requires individuals to interact effectively with others. It demands collaboration to resolve complex problems and create integrated solutions across contexts. It reaches beyond productivity to humanity. It is also a key competence for social interaction, social cohesion, harmony, justice, and ultimately a peaceful and reconciled future.

Interacting with the world: This competence enables people to be local and global. It enables awareness, sensitivity, and advocacy for collective challenges and opportunities at a local, national, regional, and global levels. It entails multi-cultural, multi-religious, multi-lingual perspectives that embrace diversity as an enriching asset. It also entails effective and positively impactful engagement from local to global levels.

Multi-literateness: The 21ˢᵗ century requires people to be multi-literates and to flexibly deploy these literacies. Basic literacy (the three "R's" of reading, writing, and arithmetic) is no longer adequate. It is perhaps more appropriate to speak of fundamental literacies. These go beyond the three "R's" to include micro competences like digital, cultural, financial, health, and media literacies. These literacies are fundamental in the 21ˢᵗ century, and even more so in Industry 4.0. They are not viewed as dichotomous, where one is either literate or illiterate. They are continuous, ranging from entry level to expert. Different contexts will demand different types and levels of literacies.

Trans-disciplinarity: Increasing complexity requires ever more sophisticated solutions that integrate knowledge from multiple disciplines and from domains of knowledge. Application is at the heart of

competence. Emphasis on application demands a deeper mastery of disciplines. The need for deep and narrow specialization will remain essential, especially in workplaces, but narrow specialists will be tremendously challenged in daily life where impactful action demands a decent level of understanding of several disciplines.

Below each of the above-outlined macro competences, the framework presents an indicative, not exhaustive, list of micro competences that contribute to the macro-level ones. Micro competences are mostly adaptable. They allow for curricula adaptability to changing contexts. 21ˢᵗ century global citizens must be multi-literate. However, different contexts demand different literacies. For instance, Industry 4.0 emphasizes digital, data, and ICT literacies. Cross-cultural communication requires cultural literacy and multilingualism, etc.

This framework therefore balances the need for dynamic change in curricula with the equal need for stability.
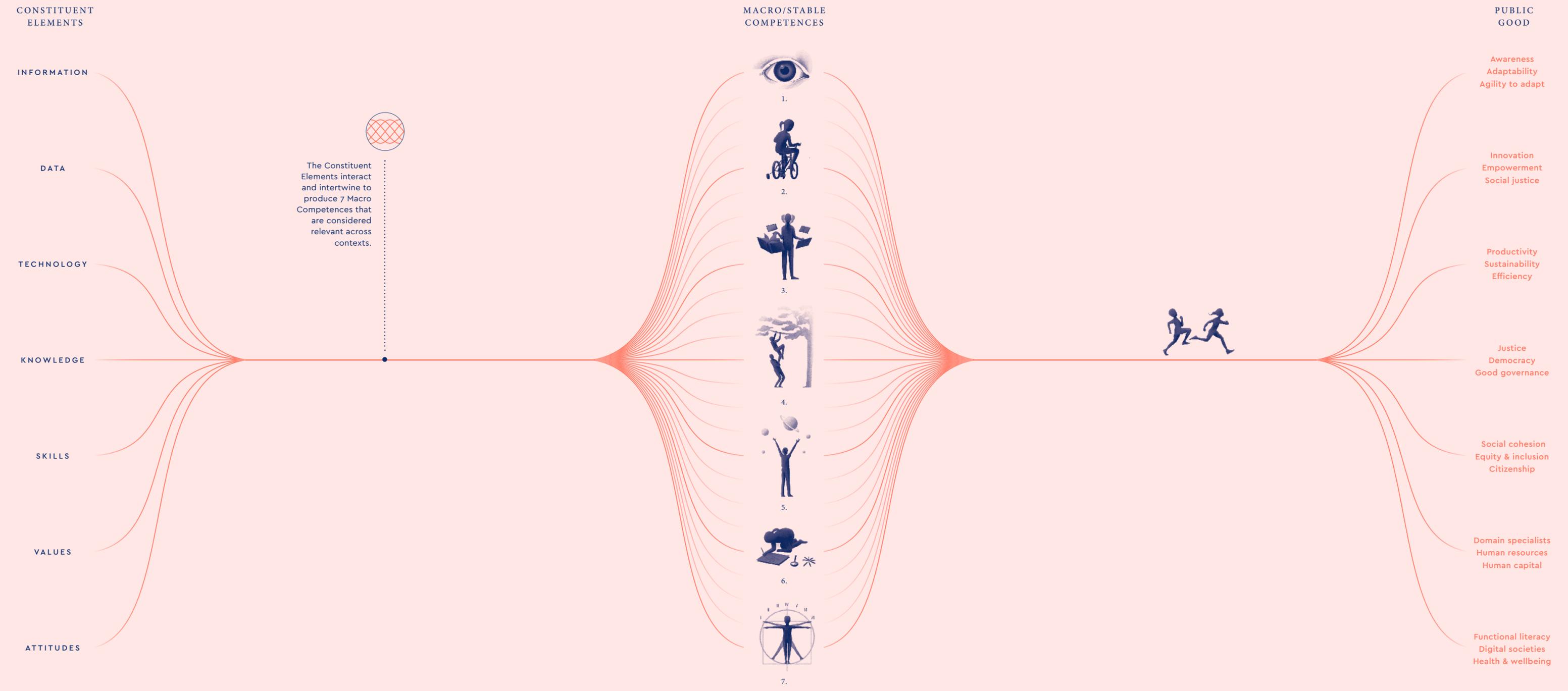
In the third panel, the framework presents examples of the individual, collective, and public "good" that should accrue from having certain competences, or the impact of competences. Notably, many of these "goods" accrue from multiple categories of competences. The framework merely suggests "goods" that are closely related to a given category of competence.

Framework of Future Competences

A definition of competence

The seven stable macro competences, listed here in order of importance, entail several different micro adaptable competences.

1
Lifelong learning
Curiosity
Creativity
Critical thinking
...

2
Self–agency
Initiative/Drive/Motivation
Endurance/Grit/Resilience
Responsibility
...

3
Interactively using diverse tools and resources
Impactful use of resources
Efficient use of resources
Responsible consumption
...

4
Interacting with others
Teamwork
Collaboration
Negotiation
...

5
Interacting in and with the world
Being local and global
Balancing rights with privileges
Balancing freedoms with respect
...

6
Trans-disciplinarity
STEM
Humanities
Social sciences
...

7
Multi-literateness
Reading & writing
Numeracy
Digital
...

CONSTITUENT ELEMENTS

INFORMATION

DATA

TECHNOLOGY

KNOWLEDGE

SKILLS

VALUES

ATTITUDES

The Constituent Elements interact and intertwine to produce 7 Macro Competences that are considered relevant across contexts.

MACRO/STABLE COMPETENCES

1.
2.
3.
4.
5.
6.
7.

PUBLIC GOOD

Awareness
Adaptability
Agility to adapt

Innovation
Empowerment
Social justice

Productivity
Sustainability
Efficiency

Justice
Democracy
Good governance

Social cohesion
Equity & inclusion
Citizenship

Domain specialists
Human resources
Human capital

Functional literacy
Digital societies
Health & wellbeing

Sustaining currency and relevance

As already noted, sustaining the relevance and currency of future competences in a fast-changing context is a challenge. To address this challenge, the IBE will establish a global curriculum observatory with adequate foresight and anticipatory capacity. Its key role will be to analyze and anticipate future trends that require a rethink of the global reference framework for future competences. It will issue periodic advisories on the future of curriculum and support research where necessary. The IBE will serve as a secretariat for the observatory whose members will be selected carefully to represent global thought leaders in the field and diverse stakeholders.

Conclusion

The future of curriculum is as bright as it is challenging. Its potential remains underutilized. The time is now to give curriculum its rightful place in individual, collective, national, and global development agendas, and in shaping the future we deserve, the future we do not know, and the future we want to bequeath new generations.

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Annex 1
Key contributors to skills/competence frameworks

Business and education consortia

Since 2002 in the United States, the Partnership for 21st Century Learning (formerly the Partnership for 21st Century Skills) has brought together business and education leaders and policymakers around a national dialogue on the importance of 21st century skills for all students. The *P21 Framework* identified skills, knowledge, and expertise students need to master in order to succeed in work and life in the 21st century, including:

– *Content Knowledge* in traditional subjects interwoven with:
– *21st Century Interdisciplinary Themes:* including global awareness; financial, economic, business and entrepreneurial literacy; civic literacy; health literacy; and environmental literacy;
– *Learning and Innovation Skills:* such as creativity and innovation; critical thinking and problem solving; and communication and collaboration;
– *Information, Media, and Technology Skills:* including information literacy; media literacy and ICT literacy;
– *Life and Career Skills:* including flexibility and adaptability; initiative and self-direction; social and cross-cultural skills; productivity and accountability; leadership and responsibility; and

– *21st Century Support Systems:* considered necessary to support implementation, including 21st century standards; assessments; curriculum instruction; professional development; and the provision of stimulating learning environments (P21, 2016).

The P21 project emphasized: deep understanding rather than shallow knowledge; the need to build understanding across and among academic subjects, as well as within 21st century interdisciplinary themes; the need to engage students with authentic real world problems, data, tools, and experts; and the need for indicators of progression to allow for multiple measures of mastery.

In 2008, a consortium involving **Microsoft, Intel, and Cisco** commissioned *The Assessment and Teaching of 21st Century Skills* project through which 250 researchers and industry representatives developed a framework to identify the [skills][3] required for living, learning, and working in the 21st century knowledge economy and digital workplace. These were grouped under four thematic headings relating to:

– *New Ways of Working:* involving an increased ability to communicate and collaborate through workplace teams;
– *New Tools for Working:* including the need to become more adept with information literacy information communication technology, as well as functional literacy;
– *New Ways of Thinking:* including the need to pay greater attention to developing creativity and innovation, critical thinking, problem solving, and decision-making; and
– *New Ways of Living in a Digital World:* including increased awareness of local and global citizenship, flexibility in living and career choices, willingness to take personal and social responsibility, cultural awareness, and cultural competence (Microsoft, Intel, and Cisco, 2010).

This project inspired further research and publications, which have influenced policy with regard to the ways that 21st century skills might be assessed and linked into school and college programs, as well as the technology needs of society and the workplace (Griffin and Care, 2015; Griffin, McGaw, and Care, 2012).

In 2015, **Google** commissioned the Economist Intelligence Research Unit to survey skills across 26 countries and 19 business sectors. They identified problem-solving, teamwork, and communication as the skills that are in high demand in the workplace. Education systems were not found to be adequately supporting learners to acquire these skills. In response, learners were learning on their own to make up for system deficiencies. 85% of the interviewed teachers considered that technology was leading teaching, and that education systems were keeping up rather than leading teaching (The Economist, 2015). These findings are consistent with those from other reports.

3 The word *skills* was adopted as a compromise term because of widespread confusion about terminology.

In 2015, **World Economic Forum (WEF)** commissioned Boston Consulting to identify the pressing issues of the 21st century skills gap and ways of closing it through technology. The report *New Vision for Education: Unlocking the Potential of Technology* (WEF, 2015) defined a set of 16 crucial proficiencies for education in the 21st century including a comprehensive list of overlapping [competences] and attributes considered essential for participation in knowledge economies and societies. Among others, the Forum sought to avoid mistakes of previous industrial revolutions by harnessing technological innovations of Industry 4.0 and the human potential to address environmental issues, and to redesign how we manage our shared global environment. The Forum identified and grouped competences under three headings:

• *Foundational Literacies,* including numeracy, scientific literacy, ICT literacy, financial literacy, and cultural and civic literacy;
• *Competences,* including collaboration, communication, and critical thinking/problem-solving; and
• *Character Qualities,* demonstrated in the ways in which students approach their changing environment, including curiosity, initiative, perseverance/grit, resilience, adaptability, leadership, and social and cultural awareness.

The WEF's 2016 follow-up report, *New Vision for Education: Fostering Social and Emotional Learning through Technology*, also prepared in collaboration with Boston Consulting, detailed social and emotional learning (SEL) as broadly encompassing 10 competences and character qualities already outlined in their previous report. These were considered "critical to the workforce of the future" as "foundational skills for academic learning" (WEF, 2016).

In 2016, the **New York Academy of Sciences** proposed the following competences, attributes, approaches, and implementation support as essential to address the demands for science technology engineering and mathematics (STEM) in an information society:

– *Essential [Competences]:* critical thinking, problem-solving, creativity, communication, collaboration, digital literacy, and computer science;
– *Supporting Attributes:* a STEM mindset, agency and persistence, social and cultural awareness, leadership, and ethic;
– *Instructional Design [Teaching] Requirements:* research-based pedagogy, STEM content integration, real-world application, project or problem based learning, scaffolding, developmental or growth assessment, cultural sensitivity and relevance, and technology integration;
– *Effective Implementation:* including ensuring accessibility, alignment to local context, professional development and learning support, access to materials and practitioners support scalability, and gathering evidence of effectiveness.

The Academy structured the standards for demonstrating competences around four steps involving the need to "explore, develop, apply, and lead". The standards also emphasize the connection between science education and solving global issues, and the need for learners to develop:

- *Social Competency:* relating to opportunities to "network and interact with investigators across many institutions and disciplines";
- *Critical Competency:* the ability to think through particular situations analytically and derive both inductive and deductive reasoning skills;
- *Communicative Competency:* to enables students to "work across disciplines, learning to communicate the value of one's work to diverse audiences";
- *Creative Competency:* to become the "next generation of innovators"; and
- *Content Competency:* in discipline-based knowledge as well as "expertise in fields ranging from education and social science to neuroscience, neurobiology, and biotechnology" (NYAS, 2016).

Specific countries

In 2003, **Northern Ireland** consulted on a radical approach to curriculum design around a framework of key elements and cross-curricular skills. The list of skills entailed communication, using mathematics, ICT, thinking skills, and personal capabilities. All these were to empower learners to achieve their potential, and to make informed and responsible choices and life decisions as individuals, contributors to society, the economy, and the environment. Thinking skills and personal capabilities framework explicitly placed information management, critical thinking, problem-solving, decision-making, creativity, managing self, and working with others at the heart of the curriculum. New areas of learning relating to personal development, local and global citizenship, and employability were also introduced. All subjects were structured around the key elements in order to more easily facilitate integrated approaches to curriculum delivery and competence development.

In 2007, **New Zealand** pioneered a new curriculum which aimed to develop 'confident, connected and actively involved lifelong learners'. It identified five key competences modelled on the DeSeCo/OECD report, including thinking, using language, symbols and texts, managing self, relating to others, and participating and contributing. It defined competences as more complex than skills, drawing on knowledge, attitudes, and values in ways that lead to action. Competences were not considered as separate or stand-alone but as ends in themselves, and as keys to learning in every area, through which other ends were to be achieved. As they develop the competences, successful learners are also motivated to use them, recognizing when and how to do so and why. The NZC recognized the need to challenge students to develop competences in contexts that are increasingly wide-ranging and complex.

In 2008, **Scotland** introduced *A Curriculum for Excellence*, which was intended to help children and youth to gain the knowledge, skills, and attributes needed for life in the 21st century, including skills for learning, life, and work. Its four key purposes were to develop "successful learners, confident individuals, effective contributors, and responsible citizens" through a number of overlapping clusters of skills. These were: personal and learning skills to become effective life-long learners; literacy, numeracy, and five core skills of communication (numeracy, problem-solving, information technology, and working with others). They also included the development of vocational skills specific to particular occupations or sectors. *Curriculum for Excellence* also highlighted four contexts for learning: (i) curriculum areas and subjects; (ii) interdisciplinary learning; (iii) the ethos and life of the school; and (iv) opportunities for personal achievement.

Around the same time, the **Czech Republic** introduced a new, progressive, *Framework of Education Programs*, based on very similar principles to Scotland and Northern Ireland, promoting general/key competences (or capacities), cross-curricula work, and teacher agency.

England also developed a revised curriculum with similar aspirations, making provision for Personal Learning and Thinking Skills (PELTS). However, this was replaced in 2014.

Japan has revised its National Curriculum Standards about every 10 years. In 2008-9, Japan revised its Course of Study (the national curriculum standard). The revised Course of Study places increased importance on the cultivation of *Ikiru Chikara* (competences required in the new era). It aims to enrich instruction and highlights a careful selection of content to respond to the needs of the individual. It emphasizes ethical education, to equip children with the judgment of good and evil, "norm consciousness", and the development of personality. The revised curriculum also encourages experimentation, problem-solving, creativity, and the ability to learn and think independently.

In 2011, the province of **Alberta, Canada** introduced a *Framework for Student Learning* which specified a number of competences, defined as combinations of knowledge, skills, and attitudes that students develop and apply for successful learning, living, and working. The Alberta competences included: managing information, critical thinking, problem-solving, creativity and innovation, communication, collaboration, cultural and global citizenship, as well as personal growth and well-being as aspects that apply within and across all subject areas.

In 2014, **Australia** articulated competences required of citizens in an information age, including: literacy, numeracy, ICT literacy, intercultural understanding, ethical understandings, critical and creative thinking, and personal and social capabilities. These were interwoven throughout the school curriculum with the expectation that teachers

would teach and assess them to the extent that they are incorporated within subject content.

Since 2012, **Finland** launched its national curriculum reform with an estimated completion in 2016. The reform addressed questions pertaining to: (i) the meaning of education in the future; (ii) types of competences that will be needed; (iii) practices that would best produce desired education and learning; (iv) competences required in society and the changed working life; and (v) skills required to build a sustainable future. Examples of basic education competences included: (i) thinking and learning; (ii) cultural competence, interaction and expression; (iii) looking after oneself, managing daily activities, safety; (iv) multi-literacies; (v) ICT competence; (vi) competence required for working life and entrepreneurship; and (vi) participation, empowerment, and responsibility (Halinen, 2016).

In 2015, **Singapore** published its *Framework for 21st century: Competencies and student outcomes* to underpin what it described as holistic education that aims to develop a confident person, a self-directed learner, an active contributor, and a concerned citizen by focusing on:

– *Core Values:* respect, responsibility, integrity, care, resilience, and harmony;
– *Social and Emotional Competences:* self-awareness, self-management, social awareness, relationship management, and responsible decision-making; and
– *21st Century Competences for a Globalised World:* civic literacy, global awareness, cross-cultural skills, critical and inventive thinking; communication, collaboration, and information skills.

In 2015, **Wales** published its framework for a revised curriculum to be implemented from 2021 focusing on four purposes that form the starting point for all decisions on the content and experiences that will form part of the curriculum. These were also designed to influence how practitioners plan, teach, and assess. They included developing all children and young people to become: (i) ambitious, capable learners; (ii) healthy, confident individuals; (iii) enterprising, creative contributors; and (iv) ethical, informed citizens.

In 2016, **British Columbia, Canada** began phasing in its new curriculum built around the concept of personalization and a "know-do-understand" model of learning. The model identified "big ideas" as well as three core competences: (i) communication; (ii) critical and creative thinking; and (iii) personal and social competence (including positive personal/cultural identity; personal awareness/responsibility and social awareness/ responsibility). These competences were considered necessary for success in life beyond school and for becoming educated citizens.

Ontario, Canada issued a discussion document on 21st century competences in 2016, building on the education vision consultations of 2013. Its renewed vision for education is to transform teaching and learning to ensure that students develop the knowledge, skills, and characteristics to become personally successful, economically productive and actively engaged citizens. It highlighted 21st century competences that contribute to: (i) cognitive; (ii) interpersonal and intra-personal growth; (iii) students' well-being; (iv) character development and success; (v) the development of "a growth mindset" and the important elements of: creativity, innovation, and entrepreneurship. All this was considered essential for on-going success in the 21st century.

Mainland China also issued in 2016 new curriculum guidelines aimed at cultivating cross-disciplinary and key competences. The curriculum was designed from a hands-on, inquiry-oriented, perspective. It encouraged integration across disciplines to strengthen students' sense of responsibility, value, identity, and creativity.

During 2016, the **Norwegian** parliament considered the renewal of subjects in the primary and lower secondary education curricula, and general subjects of the upper secondary curriculum with an aim to define fewer and clearer competence goals. Several consultations were held on skills that will power the country's future prosperity, as well as what ought to be schools of the future.

Also in 2016, **Seychelles, Kenya, Azerbaijan, Swaziland, Saudi Arabia,** and **Oman** embarked on curricula transformation agendas toward competence-based approaches. This work is in progress, and will soon provide more examples of the strong global trend toward CBC.

Multilateral agencies

Between 1998 and 2003, the **OECD's** *Definition and Selection of Competencies* (DeSeCo) project identified key competences for a successful life and a well-functioning society, emphasizing reflective thinking using complex mental processes and the application of individual competences to contribute to collective goals in relation to spheres such as:

Success for individuals: in relation to gainful employment and income, personal health and safety, political participation, and social networks.

Success for society, including: economic productivity, democratic processes, social cohesion, equity, human rights, and ecological sustainability.

Three broad categories of competences were identified including the ability to:

– *Use Tools Interactively:* including language, symbols and texts, knowledge and information, and technology;
– *Interact with Others in Heterogeneous Groups:* including the ability to relate well to others with empathy and emotional intelligence; work co-operatively (presenting ideas, debating, negotiating, sustaining alliances, and the capacity to make decisions that allow for different perspectives and shades of opinion); manage and

resolve conflict (including reframing, prioritizing, and compromising); and

– *Act Autonomously within "the Big Picture":* including (i) understanding patterns, systems, structures, cultures, and norms, as well as courses of potential action and their consequences; (ii) ability to form and conduct life plans and projects (including the defining, evaluating, prioritizing, balancing, projecting, and monitoring progress); and (iii) ability to understand and assert individual and collective rights, interests, limits and needs, understanding interests and rules, constructing arguments, and suggesting alternative solutions.

Under its *Education 2030* project, the OECD is currently conducting an international comparative analysis of curricula to build a knowledge base to underpin evidence-based and systematic curriculum design and development. The project aims to develop a conceptual learning framework relevant for 2030, and to contribute to international discussions and clarifications on the types of competences required for 2030. At a subsequent stage the project intends to support countries to explore the kind of learning environments that most effectively support the development of these competences.

In 2016, the OECD published proposals to assess 'global competency for an inclusive world' as part of PISA 2018; a complex multidimensional domain entitled as a frame of reference encompassing multiple cognitive and non-cognitive components (OECD, 2016). It proposed two definitions:

– *A competence* is "the ability to mobilize knowledge, skills, attitudes and values, alongside a reflective approach to the process of learning, in order to engage with and act in the world".
– *Global competence* is "the capacity to analyze global and intercultural issues critically and from multiple perspectives; to understand how differences affect perceptions, judgments, and ideas of self and others, and to engage in open, appropriate and effective interactions with others from different backgrounds on the basis of a shared respect for human dignity".

Further elaboration of the definition clarifies that:

– Human dignity and valuing cultural diversity are considered important concepts leading to global competence;
– "Open" means that all participants in the interaction demonstrate sensitivity toward, curiosity about, and willingness to engage with others and their perspectives;
– "Appropriate" means that all participants in the situation are equally satisfied that the interaction occurs within expected cultural norms; and

– "Effective" means that all participants are able to achieve their objectives in the interaction, at least in part.
– A globally confident person is expected to bring his/her knowledge and understanding, skills attitudes, and values together in order to work with others to solve globally relevant problems, and to improve the collective well-being of current and future generations. The expectation is that a globally confident person will be better equipped to build more just, peaceful, inclusive, and sustainable societies through what they decide and what they do.

The dimensions of the proposed assessment include:

– *Knowledge and Understanding of Global Issues:* including intercultural knowledge and understanding;
– *Analytical and Critical Thinking:* including the ability to interact respectfully with empathy and flexibility;
– *Attitudes:* including openness toward people from other cultures, respect for cultural otherness, global-mindedness, and responsibility; and
– *Values:* including valuing human dignity and cultural diversity.

In 2006, the **European Commission (EC)** identified 8 key competences that it considered necessary for personal fulfilment, active citizenship, social inclusion, and employability in a knowledge society. The *European Framework of Key Competences* identified competences such as: (i) communication in mother tongue and in foreign languages; (ii) mathematical competence; (iii) basic competences in science and technology; (iv) horizontal skills required across schooling, such as digital competence; (v) learning to learn; (vi) social and civic competences; (vii) initiative and entrepreneurship; and (viii) cultural awareness and expression.

In June 2016, the EC embarked on a public consultation to review the 2006 Key Competences. The review aimed to:

– Involve all target groups in assessing the previous use of the Framework in Members States to identify key competences needed in the future;
– Update the Framework for adoption in the 2nd half of 2017 to ensure that it reflects political, social, economic, ecological, and technological developments since 2006, and to propose changes to better reflect recent developments in areas such as multilingualism, cultural diversity, and varied ways of communicating, migration, citizenship, and sustainability issues;
– Identify useful tools and processes which can help policy makers and practitioners in their work; and
– Further promote competence-based teaching and learning

across Europe and continue to support efforts in key competence development for all; at national, regional, and local levels, and in formal and non-formal settings for citizens of all ages (European Commission, 2016).

UNESCO has a long tradition in leading global dialogue on the future of education. Milestone reports include the 1972 Faure report that brought the concept of lifelong learning into the global thinking and language of education. Better known is the 1996 Delors report, *Learning the Treasure within: A Report to UNESCO of the International Commission on Education for the Twenty-first Century*. The commission pursued six lines of inquiry that remain relevant a quarter of a century later including: (i) education and culture; (ii) education and citizenship; (iii) education and social cohesion; (iv) education, work and employment; (v) education and development; and (vi) education, research, and science. The Delors recommendations that remain highly relevant to date include:

- The call for "the establishment of new links between educational policy and development policy" to highlight the ways in which educational policies can help to create a better world by contributing to sustainable human development, mutual understanding among peoples, and a renewal of practical democracy; and
- The observation "that formal education systems tend to emphasize the acquisition of knowledge to the detriment of other types of learning" and the need "to conceive education in a more encompassing fashion to inform and guide future educational reforms and policy in relation to both contents and methods" with emphasis on four pillars of learning:

  - *Learning to know and learning to learn;*
  - *Learning to do* in order to acquire "the competence to deal with many situations and work in teams";
  - *Learning to live together:* developing an understanding of other people and an appreciation of interdependence, carrying out multi-joint projects, and learning to manage conflicts in a spirit of respect for the values of pluralism, mutual understanding, and peace;
  - *Learning to be,* so as to better develop one's personality and to be able to act with greater autonomy, judgment and personal responsibility and to develop memory, reasoning, aesthetic sense, physical capacities and communication skills (Delors et al., 1996).

In 2004, **IBE-UNESCO** published *Developing Key Competencies in Education: Some Lessons from International and National Experience.*

The framework offers a set of curriculum-bounded competences related to traditional school disciplines, including cognitive, procedural, and attitudinal aspects involved in basic activities such as:

- The ability to communicate with others both orally and in writing, good reading comprehension in the mother tongue, and the mastery of at least one foreign language;
- Basic mathematics skills and numeracy;
- Computer literacy and media competence;
- Knowledge of the natural and social world, and the development of civic attitudes.

It also offered a set of cross-curricular competences including:

- Metacognitive competences such as problem-solving, learning strategies, critical judgment, and divergent thinking;
- Intra-personal competences, such as management of motivation and emotions, self-concept, and the development of personal autonomy;
- Interpersonal competences, such as the capacity to function democratically in groups, relate well to other people; play by the rules, and manage and resolve conflict;
- "Positional competences", such as the ability to cope with complexity and deal with diversity and change (Rychen and Tiana Ferrer, 2004).

The 2014—2021 work program of **UNESCO's** division for education for sustainable development is guided by the Education 2030 Agenda and Framework for Action, notably Target 4.7 of SDG4:

Ensure that all learners are provided with the knowledge and skills to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity, and of culture's contribution to sustainable development.

Although Global Citizenship Education (GCEd) and Education for Sustainable Development (ESD) have different emphases, they are recognized as mutually reinforcing. Both emphasize the need to foster the knowledge, skills, values, attitudes, and behaviors that allow individuals to take informed decisions and assume active roles locally, nationally, and globally. Competences for sustainable development include a range of cognitive, social, and emotional capacities such as:

- *anticipatory:* the ability to understand and evaluate multiple futures (possible, probable, and desirable) to create own visions for the future, to apply the precautionary principle, to assess the

consequences of actions and to deal with risks and changes;

– *normative:* the ability to understand and reflect on the norms and values that underlie one's actions and directness, negotiate sustainability values, principles, cold from targets – in a context of conflicts of interest and trade-offs, uncertain knots and contradictions;

– *strategic:* the ability to collectively develop and implement actions and further sustainability at the local level, and further afield;

– *collaboration:* the ability to learn from others, to understand the needs, perspectives and actions of others; to deal with and approach groups with confidence, and to facilitate collaborative and participatory problem-solving;

– *critical thinking:* the ability to question norms, practices and opinions, to reflect on one's own values, perceptions and actions, and to take a position in the sustainability discourse;

– *self-awareness:* the ability to reflect on one's own role in the local community and (global) society: perceptions and actions to take a position in the sustainability discourse;

– *integrative problem-solving:* the ability to apply different problem-solving frameworks to complex sustainability problems, and develop viable solution options.