Defining Education 4.0:
A Taxonomy for the
Future of Learning

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Contents

① What is the Education 4.0 Taxonomy, and how is it useful?

Skill development begins at a young age. Research suggests that early-childhood schooling and primary education have a large positive effect on critical cognitive development, building skills which are then multiplied through learning later in life. For example, recent research by the World Economic Forum shows that investing in just one important skill area – collaborative problem-solving – could add as much as $2.54 trillion to global GDP.[1] Yet, according to UNICEF, less than half of young people around the world are currently on track to acquire the full range of skills needed to thrive at work and in life.[2]

One key challenge preventing the broad development of future-ready skills through childhood education is the lack of a common foundation, definition and understanding of the skills needed for the future and how these can be developed from an early age.

In particular, across a wide range of research into the future of work by the World Economic Forum and other organizations, employers are not only signaling demand for creativity, critical thinking, problem solving and skills relating to the development and use of technology, but are placing more and more emphasis on interpersonal and socio-emotional skills. The latter include the ability to collaborate, coordinate and communicate effectively with others. The role of education should be to prepare young learners for this future.

With the growth in demand for these skills comes the need to adopt a holistic learning approach that includes not only concrete skills for economic success, but attitudes and values that set individuals up for a lifetime of learning. These include embracing the interpersonal and societal values that promote cohesive and tolerant economies and societies, respect and uphold the integrity of their institutions, and appreciate the fragility of the natural environment.

In short, the future of education lies in empowering young learners to embrace and develop their uniquely human qualities – those unlikely to ever be replaced by technology. The World Economic Forum refers to the teaching and learning of this set of abilities, skills, attitudes and values as "Education 4.0", a framework developed through deep and broad consultation with education experts from schools, non-profits, education ministries and the private sector and refined over the course of several previous publications (see Figure 1).

FIGURE 1 | The World Economic Forum's Education 4.0 framework

Content (built-in mechanisms for skills adaptation)

Global citizenship skills
To include content that focuses on building awareness about the wider world, sustainability and playing an active role in the global community.

Innovation and creativity skills
To include content that fosters skills required for innovation, including complex problem solving, analytical thinking, creativity and system analysis.

Technology skills
To include content that is based on developing digital skills, including programming, digital responsibility and the use of technology.

Interpersonal skills
To include content that focuses on interpersonal emotional intelligence (i.e. empathy, cooperation, negotiation, leadership and social awareness).

Experiences (utilization of innovative pedagogies)

Personalized and self-paced learning
From a system where learning is standardized, to one based on the diverse individual needs of each learner, and flexible enough to enable each learner to progress at their own pace.

Accessible and inclusive learning
From a system where learning is confined to those with access to school buildings to one in which everyone has access.

Problem-based and collaborative learning
From process-based to project- and problem-based content delivery, requiring peer collaboration and more closely mirroring the future of work.

Lifelong and student-driven learning
From a system where learning and skilling decrease over one's lifespan to one where everyone continuously improves on their existing skills and acquires new ones based on their individual needs.

Building on this work, *Defining Education 4.0: A Taxonomy for the Future of Learning* is an attempt at clearly spelling out – in a practical and accessible format – these abilities, skills, attitudes and their associated definitions.

In particular, the Education 4.0 Taxonomy is fully integrated with the Forum's existing work on the creation of a Global Skills Taxonomy, aimed at adult workplace and lifelong learning.[3] The Education 4.0 Taxonomy aims to bridge the disconnect that sometimes exists between young and adult learners, by demonstrating how skills acquired during early childhood, primary and secondary education continue to be developed and defined in the workplace. It will thereby provide guidance for educators, education policy-makers and others on the evolving needs of the labour market.

Furthermore, aligning the Education 4.0 Taxonomy with the Forum's Global Skills Taxonomy provides a framework for the private sector, as the beneficiary of future talent, to prioritize investing in skills development from an early age and in a responsible manner. In this context, the taxonomy also aims to create an organizing principle by which best practices can be exchanged on how to incorporate workplace-relevant skills of the future into childhood education.

Most of the premises and research behind Education 4.0 are not new, and have been embraced by experts, educators and others in the education workforce for years. In addition, several comprehensive and well-established learning frameworks – such as the OECD's Learning Compass 2030 – have acted as important reference points for this work. This Education 4.0 Taxonomy will provide a valuable complementary tool for fostering increased multistakeholder dialogue between expert audiences, educators, policy-makers and employers for reimagining a future-proof education system.[4]

2 An overview of the Education 4.0 Taxonomy

Getty/Monkey Business Images

The Education 4.0 Taxonomy consists of a comprehensive set of *aptitudes*, organized into a tree structure. Aptitudes are the abstract, transferable aspects of learning. They are teachable and learnable qualities – not innate characteristics.

Most education taxonomies that pertain to childhood through secondary education identify three primary groups of aptitudes: (1) abilities and skills, (2) attitudes and values, and (3) knowledge and information (see Figure 2). The Education 4.0 Taxonomy places particular focus on the former two categories, as experts and employers indicate that these learning areas will require additional emphasis in future education systems relative to the emphasis they get today.

The traditional forms of knowledge and associated learning methods are also valuable, nevertheless, and will always play some role in the teaching content and methods of education systems. The Education 4.0 Taxonomy therefore includes the knowledge and information branch of aptitudes for completeness.[5]

These three primary branches constitute the first level of the taxonomy, and are in turn expanded into several second-level sub-branches. Within the first and second levels, the taxonomy branches remain a mutually-exclusive, collectively-exhaustive set of categories. At the third level, however, the concepts covered are no longer exhaustive, and should be understood as the aptitudes that Education 4.0 seeks to build. These aptitudes have been highlighted by the literature on the future of work and emphasized in consultations with employers as well as experts and organizations focused on education innovation.[6]

FIGURE 2: **The Education 4.0 Taxonomy**
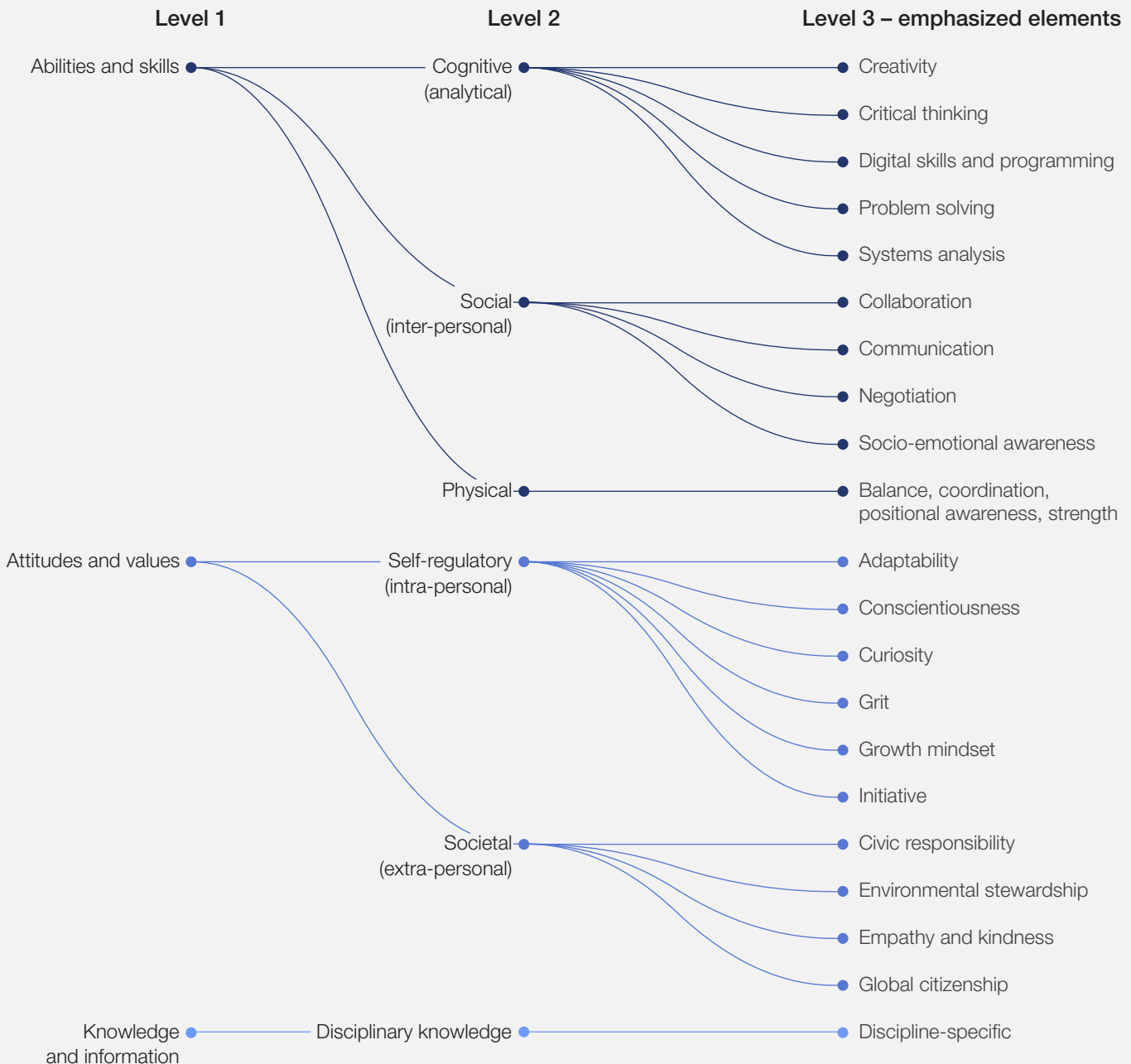
A | Abilities and skills

Abilities and skills are the set of process-oriented capabilities that enable an individual to achieve a specific goal. At the highest level of abstraction, abilities and skills fall into either: (1) cognitive and analytical aptitudes, including creativity, critical thinking and problem solving; or (2) interpersonal (non-cognitive) aptitudes, including communication, collaboration and the suite of socio-emotional skills.[7]

Skills falling into these two realms feature prominently among the skills sought after by employers. In one study of 2 million online job postings, the top five skills that employers requested were communication, creativity, collaboration, creative problem-solving and critical thinking.[8] A similar study found that, between

2012 and 2015, the skills whose demand grew the most were digital literacy (with a 212% increase in requests), critical thinking (158% increase) and creativity (65% increase).[9]

Education systems have traditionally placed greater emphasis on cognitive and analytical skills than interpersonal skills. While employers' emphasis on interpersonal skills is not a new development, these skills continue to be a bottleneck in the hiring process.[10] Socio-emotional skills have been found to influence grades and performance – measures that themselves influence job preparedness and employability.[11] Beyond mere academic performance, students who learn to play well with others by the age of three are found to have better mental health later in primary school.[12]

B | Attitudes and values

Attitudes and values embody the set of beliefs that inform self-regulatory behaviour, such as personal motivation, and engagement with broader society, such as moral or ethical considerations. Attitudes and values tend to be subjective in nature; for example, while the principles of learning multiplication or division may be relatively absolute, the idea of good citizenship may have different nuances across national and cultural lines.

Nevertheless, these qualities are essential in teaching children to adopt a growth mindset and become resilient lifelong learners. They are also essential for promoting social cohesion among the diverse set of individuals that together constitutes the most globalized generation in human history. Attitudes and values are less concerned with how something should be done, but rather "why" it should be done. These aptitudes have a strong motivational component, which is essential for fostering the resilience necessary to surmount difficult challenges, including the challenges of learning itself.

The Education 4.0 Taxonomy classifies attitudes and values into two categories: (1) intra-personal, self-regulatory qualities, including the curiosity, confidence and initiative necessary to cultivate a growth mindset, and the resilience and grit that enable individuals to surmount challenges and setbacks; and (2) extra-personal, societal aptitudes, including having the cultural competence to

engage with individuals from different regional and cultural backgrounds, and the development of civic responsibility, in which individuals engage in the political process, respect civic institutions, value and protect natural ecosystems, and contribute to the development of cohesive communities. Education philosophers as early as John Dewey in the early 20th century believed that it was in the interests of broader society to teach values as part of the education curriculum.[13]

An individual's attitudes and values shape the social context through which all other aspects of life operate. For example, providing moral and ethical foundations is essential for teaching individuals to resolve conflict through reasoning and negotiation, rather than through deceit, violence or abuse of power.[14] Such individual actions cumulatively set the direction for society as a whole.

The rapid progression of technological development also calls for a corresponding set of values to ensure that individuals are treated fairly, and that their safety and freedoms are preserved. Some of the technologies that will require ethical guidance in the near future include gene editing, machine learning algorithms that search and sort individuals (such as those used to determine insurance or employment eligibility, which may inadvertently evaluate candidates on personal characteristics), self-driving vehicles, and data collection and surveillance systems.

C | Knowledge and information

Knowledge and information will always lie at the heart of education and learning. Even rote memorization – a learning method that has been practiced for millennia – will likely remain relevant to some degree in future educational curricula. However, new technologies have changed the way in which people interact with raw information. On the one hand, the proliferation of the internet and mobile computing devices has led to a massive increase in the amount of knowledge and information generated by, and shared between, individuals.

On the other hand, the amount of this knowledge and information is so vast that new technologies are needed to collect, process and interpret it. In this sense, the economies of the future will require advanced *skills and abilities* to interpret the future proliferation of knowledge and information, and the appropriate *attitudes and values* to guide those interpretations. For this reason, the Education 4.0 Taxonomy places less direct emphasis on knowledge and information per se, and rather addresses it indirectly through the other aptitudes in the taxonomy.

3 The taxonomy in action: Education 4.0 learning experiences


Unsplash/Amelie Mourichon

A fundamental premise of Education 4.0 is that an abstract aptitude, such as *problem solving*, in practice should not be simply taught on its own, but rather *through* developing a particular competency, such as solving a particular real-world challenge or problem.

To provide a technology-related example, a child tasked with developing a simple gaming app would be acquiring and exercising a particular competency. This would constitute a specific, concrete instance of learning. In the process of developing the app, the child may employ the *problem solving* or *critical thinking* aptitudes.

Problem solving is abstract and transferable in the sense that while it applies to developing the game app, it could also apply to many other tasks or competencies, such as solving a mathematical problem. Yet *problem solving* cannot easily be taught on its own, independent of a concrete task. To continue with the gaming app example, if the app is developed in a group setting, the child may exercise not only *problem solving* and *critical thinking*, but also *collaboration*, and perhaps *socio-emotional awareness*. By ensuring that the gaming app and related technology do not offend or hurt anyone, the child may also learn to exercise *civic responsibility* or *global citizenship* (see Figure 3(a)).
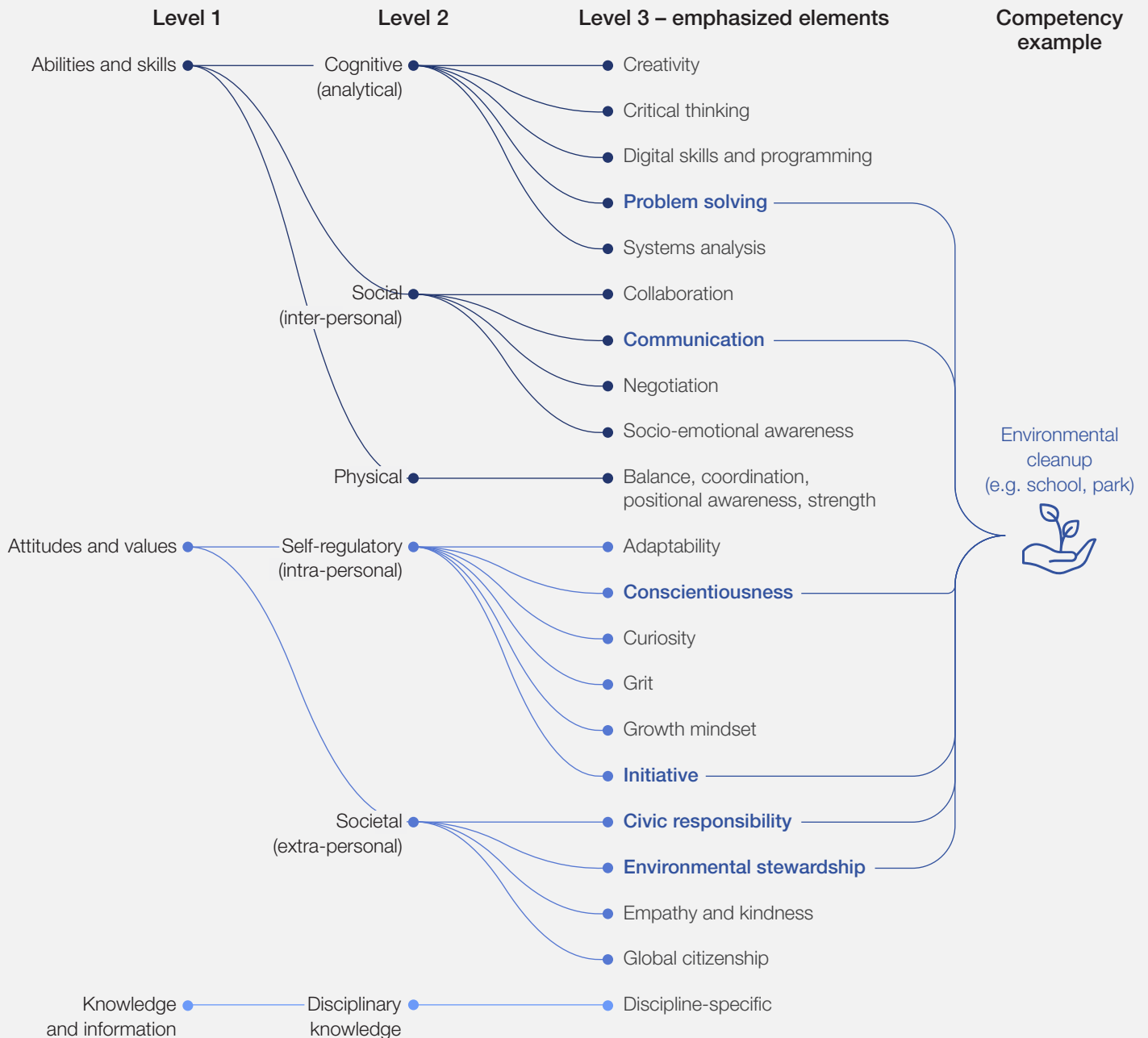
FIGURE 3(A): | Example of combining aptitudes in learning
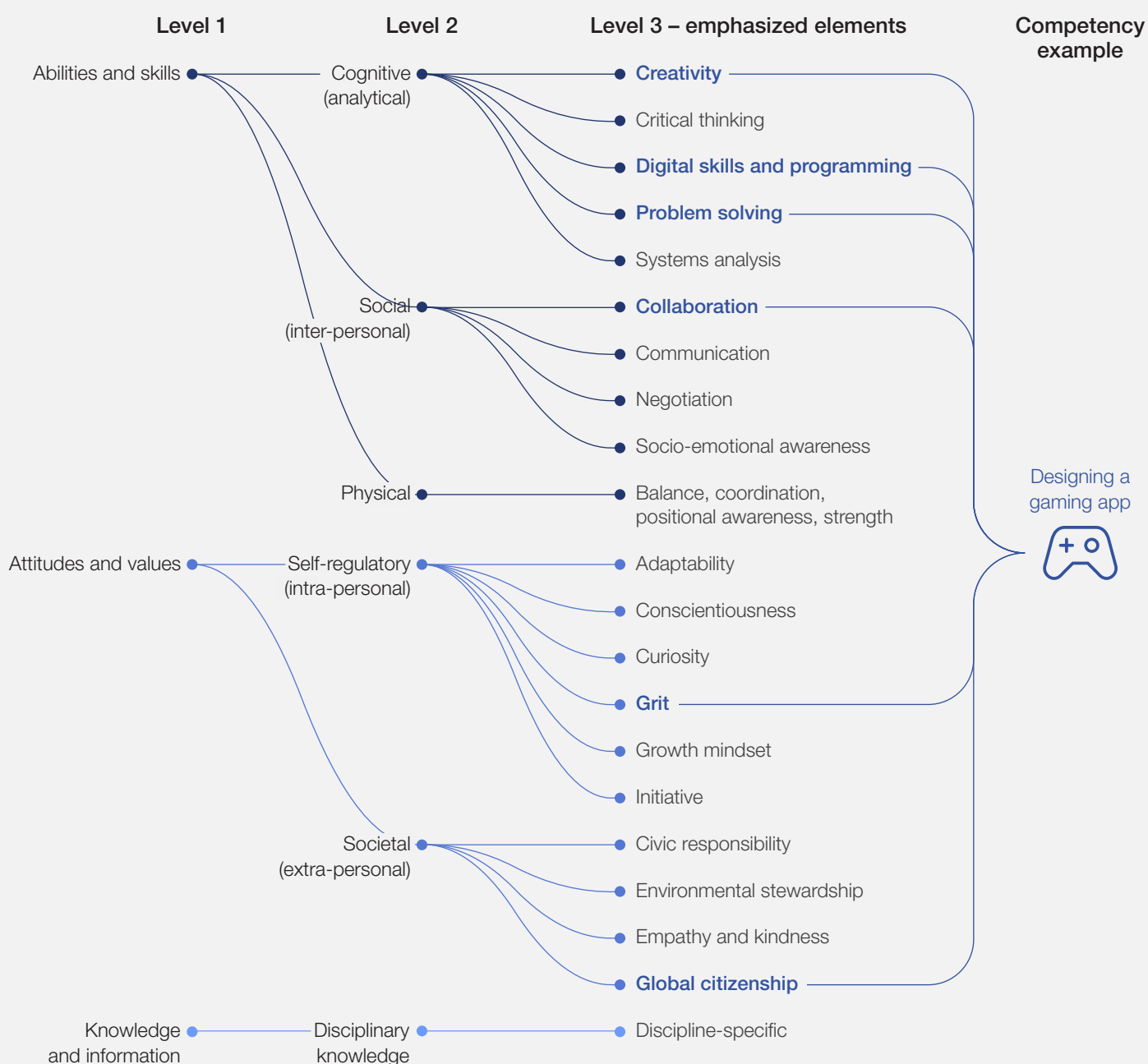
To give a second example, related to the development of a civic mindset and service to the local community, consider an environmental clean-up project that focuses on school grounds or a public park. To undertake the project, students would first engage their *problem-solving* abilities to research and decide the best approach to the clean-up, and if working in a group setting, *communication* would be essential to ensure that all group members have the same understanding of the approach to take. Of course, the key value emphasized in an environmental clean-up is *environmental stewardship* in addition to *civic responsibility*. With respect to self-regulatory attitudes and values, these societal values help to cultivate student *initiative* and a sense of individual *conscientiousness* to get the job done properly, especially if the entire undertaking is run by students themselves (see Figure 3(b)).

FIGURE 3(B): Example of combining aptitudes in learning

Level 1	Level 2	Level 3 – emphasized elements	Competency example
Abilities and skills	Cognitive (analytical)	Creativity / Critical thinking / Digital skills and programming / **Problem solving** / Systems analysis	Environmental cleanup (e.g. school, park)
	Social (inter-personal)	Collaboration / **Communication** / Negotiation / Socio-emotional awareness	
	Physical	Balance, coordination, positional awareness, strength	
Attitudes and values	Self-regulatory (intra-personal)	Adaptability / **Conscientiousness** / Curiosity / Grit / Growth mindset / **Initiative**	
	Societal (extra-personal)	**Civic responsibility** / **Environmental stewardship** / Empathy and kindness / Global citizenship	
Knowledge and information	Disciplinary knowledge	Discipline-specific	

These two simple examples illustrate how practice-oriented teaching methods can actually develop and exercise multiple aptitudes at once, emphasizing an important aspect of cross-disciplinarity that applies directly to other real-world experiences, within and beyond work life, and over a lifetime of learning and skill development. This allows them to be easily tied to learning environments and teaching pedagogies to provide a blueprint for complete learning pathways. For example, learning by play, learning by example and learning through experience are learning methods that can engage competencies directly.

Although this is not the primary focus – and the details are beyond the scope of the current publication – the Education 4.0 Taxonomy is meant to be a part of a larger, comprehensive Education 4.0 approach to reimagining the education system, which crucially includes learning methodologies and empowering the teachers to bring those methodologies to life.

Specifically, the Education 4.0 framework identifies four primary domains for innovative pedagogies to guide the teaching and learning of childhood competencies for the future (see Box 1).[15] Of course, some of these pedagogies will be better suited for certain types of learning, and ultimately the context of the content and the individual characteristics of the student will determine the best learning strategies.[16]

BOX 1:

Education 4.0 Learning Experiences: Four primary teaching and learning domains

1. Personalized and self-paced learning

Personalized learning is learning that engages each individual student's interests, which elicits engagement and promotes active learning, both of which are found to build cognitive skills, social skills and a growth mindset.[17] A relevant form of personalized learning is guided learning, which occurs when teachers provide hints, direction and feedback in students' self-guided discovery – sometimes also referred to as scaffolding.

This form of personalized learning has been found to be particularly effective in teaching cognitive skills.[18] Closely related is learning through inquiry, which is a form of guided learning in which learning material is presented in the context of open-ended questions. Inquiry-based learning has been shown to be particularly effective in learning mathematical and scientific concepts.[19] Personalized learning also, ideally, takes into account a student's background, including their cultural and personal contexts,[20] and socio-economic circumstances.[21]

2. Accessible and inclusive learning

Accessible and inclusive learning embraces multilingual and multicultural learning opportunities, which teach the values of cultural competence – a key component of global citizenship. This is often closely associated with "multiliteracy" learning, which acknowledges that learning is embodied within linguistic and cultural contexts.[22] It also enables access to learners across abilities and backgrounds.

### 3. Problem-based and collaborative learning

Problem-based and project-based learning, along with the closely related experiential learning, provide meaning to the learning process.[23] Research suggests that experiential learning can help promote positive relationships between students, teachers and the communities they serve, including the promotion of environmental awareness.[24] Examples include service-based learning,[25] which connects students with their communities, fostering awareness of political issues and social needs, and cultivating the attitudes and values pertaining to global citizenship and civic responsibility. Collaborative learning emphasizes social and emotional skills, and promotes an understanding of interdependence in a group setting and personal accountability to the group. Beyond social and societal aptitudes, learning in cooperation and collaboration with others has also been shown to boost performance in cognitive skills, including reading and mathematics.[26]

4. Lifelong and student-driven learning

The Education 4.0 Taxonomy outlines the essential learning abilities, skills, attitudes and values essential to guide learning from early childhood through secondary school. The Education 4.0 Taxonomy, paired with the World Economic Forum's Global Skills Taxonomy (to which the Education 4.0 Taxonomy elements are seamlessly matched), provides a blueprint for holistic lifelong learning that can take place within, and beyond, the formal classroom setting.

(4) The Education 4.0 Taxonomy and the Global Skills Taxonomy
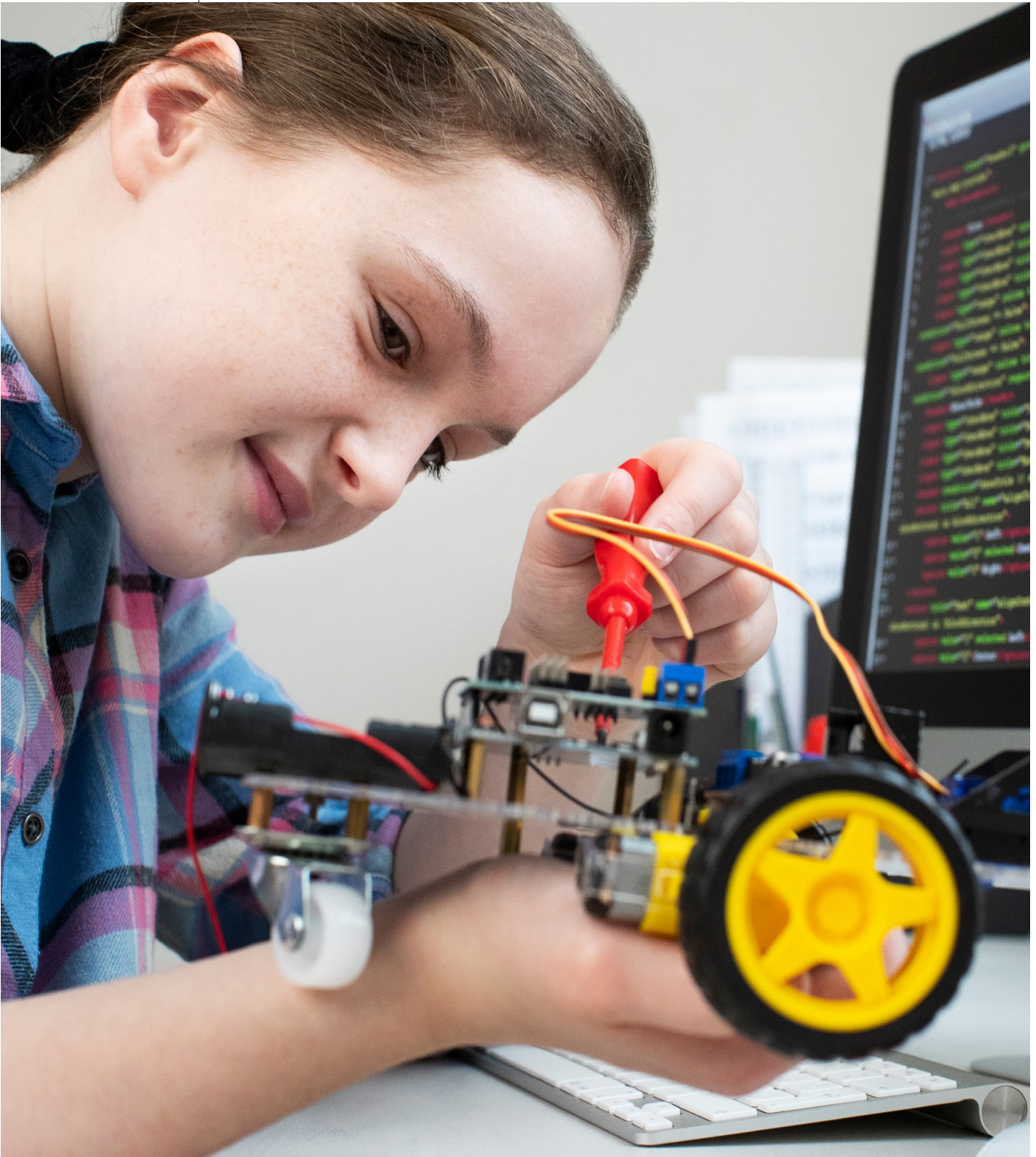
Getty/Daisy Daisy

The Education 4.0 Taxonomy, together with the Global Skills Taxonomy, provides a roadmap of the job roles projected to grow in the economies of tomorrow. As an example, recent research by the World Economic Forum and other organizations indicates a stronger market demand for data analysts than for any other occupation until 2025.[27] The key skills relating to this occupation are specified in the Global Skills Taxonomy (under the category "Technology Design and Programming", a sub-branch of the category "Skills and Knowledge"), which are then mapped to the Education 4.0 Taxonomy, revealing how foundational skills relevant to the data analysis profession can be learned as early as secondary school, while upskilling in the field can be pursued throughout adult life. The Global Skills Taxonomy similarly provides a wide range of harmonized definitions of the skills needed for any job of the future, outlining them in a comprehensive taxonomy tree.

The Education 4.0 Taxonomy thus extends this Global Skills Taxonomy roadmap "downward" to earlier ages, starting from early childhood and bridging the gap to learning that picks up at the secondary level. For example, the taxonomy emphasizes the core skills that data analysts need, such *as critical thinking*, *digital skills and programming* and *problem solving*. Moreover, the cross-disciplinary flexibility of the Education 4.0 Taxonomy, in combination with guidance from the Education 4.0 learning experiences, allows for socio-emotional skills and essential attitudes and values to be learned alongside core technical skills. A student following this trajectory would hence be well-prepared to enter the professional field of data analysis by adult age.

At a more general level, the Education 4.0 Taxonomy serves as a useful baseline and starting point for meaningful multistakeholder exchange on best practices for fostering future-ready skills. Removing the nomenclature and definition barriers on skills discussions across the integrated Education 4.0 and Global Skills taxonomies thus allows for:

– A more holistic agenda that spans childhood education and workforce learning.

– Multistakeholder discussions that use a common understanding of what those skills look like across the lifelong learning spectrum.

– A common foundation for identifying and scaling best practices for fostering Education 4.0 skills.

Conclusion: A work in progress

Ensuring that the Education 4.0 Taxonomy delivers on this vision will require multistakeholder collaboration to ensure a holistic approach to skill development from childhood through to working life. Based on the common definition of Education 4.0 skills provided in the taxonomy, business leaders, investors, governments and educators will need to work together to foster and scale opportunities for children to develop these skills from an early age. This section outlines the key actions that the various stakeholders could take to foster Education 4.0 skills.

Business

Employers are often the best positioned to take the lead on the global skills agenda. For reskilling and upskilling efforts to pay off in the future, investments in future-ready skills need to be made from an early age to enable learners to acquire the ability to learn and re-learn in a changing labour market. Businesses should seek opportunities to work with schools and the broader community to develop Education 4.0 skills as part of their broader efforts to build more equitable economies and societies and develop their future talent pipelines. Specific actions may include:

– Sharing concrete examples with schools, educators, parents and the broader community of how Education 4.0 skills enable workplace success. More specifically, businesses should invite classrooms into their work spaces to concretely demonstrate how these skills are applied at work.

– Offer opportunities for teachers to engage in broader learning and development programmes, particularly opportunities that would empower teachers to understand how Education 4.0 skills are deployed in the workplace.[28]

Government

Through its consultative multistakeholder design, including direct input from employers, the Education 4.0 Taxonomy provides governments a framework for shaping curricula that are more closely aligned with the future of work. To that end, governments can utilize the taxonomy by:

– Updating teacher training programmes to incorporate teaching strategies focused on Education 4.0 skills. These training programmes can be co-developed with the private sector, and incorporate time for teachers to enter work spaces to understand how these skills are deployed in practice.

– Updating national curricula standards to reflect a focus on Education 4.0 skills.

– Undertaking marketing campaigns targeted at teachers and parents around the importance of Education 4.0 skills for child development and for the future of work.

– Investing in education technology that supports Education 4.0 skill development.

Getty/Skynesher

Educators

As the key drivers of learning, teachers play a critical role in fostering Education 4.0 skill development. The Education 4.0 Taxonomy can enable teachers to align their practices more closely with future workplace expectations for their students. Specific actions may include:

– Adapting teaching and learning practices to focus on fostering Education 4.0 skills, explaining to students and parents that these skills will be key for future employability.

– Adapting assessment mechanisms to focus on tracking the development of Education 4.0 skills.

– Providing opportunities for students to observe how Education 4.0 skills are deployed in the workplace.

Parents

– Fostering Education 4.0 skills at home through play. Key resources, such as those provided by The LEGO Foundation, provide specific playful activities that can help foster Education 4.0 skills such as innovation and creativity.

– Providing opportunities for children to give back to their communities through activities such as gardening, volunteering and mentoring younger children. These activities can support the development of Education 4.0 attitudes and values.

Over the course of 2022-2023, the World Economic Forum will be collecting best practice examples of innovative approaches for fostering Education 4.0 skills through multistakeholder collaboration. The goal is to amplify and scale these approaches to ensure that all children have access to Education 4.0 skills, in keeping with the World Economic Forum's Reskilling Revolution, which aims to empower 1 billion people with better education, skills and economic opportunity by 2030." These approaches – serving as "Education 4.0 Lighthouses" – will also provide useful guidance for a wide variety of stakeholders seeking to foster Education 4.0 skills.

The Education 4.0 team invites interested experts, business leaders, policy-makers and educators to join them in this important work.

Appendix: Definitions

Level 1 definitions	Level 2 definitions	Level 3 definitions	Mapping to Global Skills Taxonomy
Abilities and skills A set of process-oriented capabilities that, when employed via a specific competency, allow an individual to achieve a specific goal. They answer the "how" questions in achievement.	**Cognitive (analytical)** Skills that emphasize structured thinking and calculation, deductive and inductive reasoning, and development of understanding by functional analogy in varying contexts.	**Creativity** An iterative process embodying the ability to innovate, to think across disciplines and domains (interdisciplinarity), and to imagine novel solutions to meaningful problems, especially in unexpected ways.[29] Creativity is defined as a cognitive aptitude.[30]	Skills, knowledge and abilities/Cognitive skills/ Creativity and problem solving/Creative thinking
		Critical thinking Deductive reasoning to infer logical conclusions, and inductive reasoning to infer greater generalized understanding, with respect to making sound judgements, including those related to decision-making and comparisons of potential outcomes of hypothetical scenarios;[31] the ability to engage with seemingly contradictory sets of information, for instance, with regard to media literacy.	Skills, knowledge and abilities/Cognitive skills/ Creativity and problem solving/Critical thinking
		Digital skills and programming Skills relating to the creation and use of technology, including digital technologies, the internet and new forms of networked information; especially emphasizing skills in deductive reasoning, algorithm design and abstract concepts relating to data and information.[32]	Skills, knowledge and abilities/Technology skills

Level 1 definitions	Level 2 definitions	Level 3 definitions	Mapping to Global Skills Taxonomy
Abilities & skills A set of process-oriented capabilities that, when employed via a specific competency, allow an individual to achieve a specific goal. They answer the "how" questions in achievement.	**Cognitive (analytical)** The skills that emphasize structured thinking and calculation, deductive and inductive reasoning, and development of understanding by functional analogy in varying contexts.	**Problem solving** The ability to break down large, complex problems into smaller, simpler tasks for systematic resolution.[33]	Skills, knowledge and abilities/Cognitive skills/Creativity and problem solving/Analytical thinking
		Systems analysis The ability to apply abstract models of varying levels of complexity to empirical phenomena to facilitate the understanding of systemic outcomes. The capacity to understand how concepts work together, what is the bigger whole of which something is a part, and how to identify patterns over time.[34]	Skills, knowledge and abilities/Cognitive skills/Creativity and problem solving/System thinking

Level 1 definitions	Level 2 definitions	Level 3 definitions	Mapping to Global Skills Taxonomy
Abilities and skills A set of process-oriented capabilities that, when employed via a specific competency, allow an individual to achieve a specific goal. They answer the "how" questions in achievement.	**Social (inter-personal)** The skills that enable individuals to understand themselves with respect to others, cultivate relationships, work in groups, resolve conflict and utilize organizational complexity.	**Collaboration** The ability to cooperate with others and to coordinate complex tasks in groups of individuals to ensure that tasks are completed effectively;[35] adjusting one's actions in relation to others'.[36]	Attitudes/Working with others/Leadership and Social Influence and Attitudes/Working with others/Service orientation, and Skills, knowledge and abilities/Management skills/Operations and logistics
		Communication Clear communication, in both verbal and written form; involving active speaking and writing, reading and active listening.[37]	Skills, knowledge and abilities/Cognitive skills/Speaking, writing and language
		Negotiation The ability to find common ground and reconcile differences among disparate points of view,[38] especially without losing sight of one's own or others' intentions or goals.[39]	Attitudes/Working with others/Leadership and social influence/Negotiation and persuasion
		Socio-emotional awareness The ability to read and understand the emotions and desires of others, distinguish correctly between them and observe how they can influence one's environment and social interaction, and what can be done about it;[40] the ability to empathize; emotional intelligence.	Attitudes/Working with others/Empathy and active listening/Empathy

Level 1 definitions	Level 2 definitions	Level 3 definitions	Mapping to Global Skills Taxonomy
Abilities and skills A set of process-oriented capabilities that, when employed via a specific competency, allow an individual to achieve a specific goal. They answer the "how" questions in achievement.	**Physical** Skills that relate one's body to the physical, tangible world.	**Balance, coordination, positional awareness, strength** The set of abilities to use physical tools, operations and functions.[41]	Skills and knowledge/ Physical abilities/Manual dexterity, endurance and precision

Level 1 definitions	Level 2 definitions	Level 3 definitions	Mapping to Global Skills Taxonomy
Attitudes and values The set of beliefs that inform self-regulatory behaviour and engagement with broader society. Attitudes and values are less concerned with how something should be done, but rather "why" it should be done.	**Self-regulatory (intra-personal)** The dispositions that reinforce self-regulating behaviour, personal growth and self-sufficient agency in the world. These aptitudes are sometimes referred to as "meta-cognitive" in the sense that they are self-reflective in evaluating one's engagement with the world.[42]	**Adaptability** The willingness to expose oneself to new situations, and comfort in dealing with uncertainty.[43] Demonstrating sufficient self-reflection to understand when a particular approach is not working, and a willingness to readily change course.[44]	Attitudes/Self-efficacy/ Resilience, flexibility and agility/Adaptation to change
		Conscientiousness Diligence, efficiency and organization in accomplishing tasks; also, honesty, ownership, responsibility and accountability with respect to their successful execution.[45]	Attitudes/Self-efficacy/ Dependability and attention to detail
		Curiosity The quality of experiencing wonder, the desire to ask questions, the willingness to experiment, the openness to experiencing and actively exploring and discovering new areas.[46]	Attitudes/Self-efficacy/ Curiosity and lifelong learning/Curiosity

Level 1 definitions	Level 2 definitions	Level 3 definitions	Mapping to Global Skills Taxonomy
Attitudes and values

The set of beliefs that inform self-regulatory behaviour and engagement with broader society. Attitudes and values are less concerned with how something should be done, but rather "why" it should be done. | **Self-regulatory (intra-personal)**

The dispositions that reinforce self-regulating behaviour, personal growth and self-sufficient agency in the world. These aptitudes are sometimes referred to as "meta-cognitive" in the sense that they are self-reflective in evaluating one's engagement with the world.[48] | **Grit**

Passion and perseverance for long-term goals.[47] Resilience in the face of adversity.[48] | Attitudes/Self-efficacy/ Resilience, flexibility and agility/Frustration management |
| | | **Growth mindset**

The belief that [intellectual] ability can be developed;[49] paired with the confidence to attempt a task and risk being wrong;[50] and the humility to accept and learn from one's mistakes, while not being impaired by an inflated ego. Setbacks are interpreted as "not yet" rather than failure. Research indicates that "perceived self-efficacy and personal goals enhance motivation and performance".[51] | Attitudes/Self-efficacy/ Curiosity and lifelong learning/Willingness to learn |
| | | **Initiative**

The vision to imagine new goals and the drive to attempt to reach them. The willingness to take on responsibilities and challenges.[52] Being proactive and taking the first step without waiting for what others say or do.[53] | Attitudes/Self-efficacy/ Curiosity and lifelong learning/Initiative |

Level 1 definitions	Level 2 definitions	Level 3 definitions	Mapping to Global Skills Taxonomy
Attitudes and values The set of beliefs that inform self-regulatory behaviour and engagement with broader society. Attitudes and values are less concerned with how something should be done, but rather "why" it should be done.	**Societal (extra-personal)** The values that establish sustainable, safe societies that promote the well-being of all.	**Civic responsibility** The demonstrable regard for: justice, pluralism, political engagement, integrity of civic institutions and respect for political processes; all in the name of promoting solidarity with neighbours, and the development of cohesive communities.[54] The desire and ability to play an active role in the global and local communities and the application of civic values.[55]	Attitudes/Ethics/Civic responsibility/Social justice
		Environmental stewardship The respect for the fragility and finiteness of natural ecosystems and natural resources, and an understanding of how to interact with them in sustainable ways,[56] including conservation, restoration and sustainable use of resources.[57]	Attitudes/Ethics/Civic responsibility/Environmental ethics
		Empathy and kindness The capacity to understand the feelings and points of view of others.[58]	Attitudes/Working with others/Empathy and active listening/Empathy
		Global citizenship Cultural competence. A universal respect and valuation (awareness and understanding) of people from other cultures, and their beliefs and practices;[59] implies embracing diversity, equity and inclusion. Many other organizations also define global citizenship as respect for others.[60]	Attitudes/Ethics/Civic responsibility/Social-cultural awareness

Level 1 definitions	Level 2 definitions	Level 3 definitions	Mapping to Global Skills Taxonomy
Knowledge and information Possession of fundamental information on various topics. These aptitudes reflect the "what" of learning, and have traditionally been emphasized in most education systems.	**Disciplinary knowledge** Disciplinary knowledge relating to many specific domains.	**Domain-specific skills** Specific domains of knowledge and information are not listed, but this category is included for completeness.	Skills and knowledge/ Industry-specialized

Contributors

World Economic Forum

Genesis Elhussein, Action Lead, Education,
Skills and Learning

Till Leopold, Head, Education, Skills and Learning

Andrew Silva*,* Insights Lead, Education,
Skills and Learning

Saadia Zahidi, Managing Director

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4   Expert consultation.

5   Expert consultation.

6   Expert consultations recommended that the taxonomy be restricted to Level 2 or Level 3.

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