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The Learning Ecosystems Framework:

Literature Review

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Executive Summary

Education systems require fundamental change. Traditionally, curricula are highly standardised; success is measured largely by test results; and learners and educators alike feel disengaged, undervalued and unfulfilled by their experiences in the classroom. The arrival of the pandemic in 2020 highlighted the fragility of current education systems and shattered any pretence that we could return to “business as usual” once school doors were open again. This disruption left students, on average, five months behind on mathematics and three months behind on reading by the end of the school year (McKinsey, 2021). It also widened pre-existing inequalities in education systems all over the world—particularly for the most vulnerable. The World Bank estimates that 72 million more primary-school-aged children will be unable to read or understand a simple text by the age of ten (World Bank, 2020).

Revitalising education requires a fundamental shift in thinking—away from a traditional, standardised, top-down approach towards a more integrated, collaborative and personalised one. The idea of a “learning ecosystem” represents this shift. By expanding our vision of where, how and from whom children learn, we are able to support more effective systems and prepare young people to lead happy, successful and productive lives.

Defining a learning ecosystem and understanding how to enable one effectively in practice—particularly at the national level—is challenging.

In January 2022 Economist Impact conducted a comprehensive literature review of over 70 academic papers and other sources, produced mostly between 2016 and 2022, in order to:

1. Understand how others have defined learning ecosystems;
2. Develop a working definition of our own;
3. Identify the stakeholders and institutions that make up a learning ecosystem; and
4. Evaluate the factors that enable a successful learning ecosystem.

The findings from this literature review have informed the development of a learning ecosystem framework that identifies key factors enabling the development of effective learning ecosystems to provide children with the knowledge, skills, attitudes to learning, environment, tools and equitable opportunities to reach their full learning potential and promote positive outcomes. These factors include:

- **Policies and plans:** Are policies or plans in place at the national and/or local level that support effective learning within and across various learning environments?
- **Resources:** What types of financial resources are available to enable effective learning for young people?
- **Infrastructure:** What types of physical and digital infrastructure are available to support young people in their wellbeing and learning?
- **Learning facilitator capacity:** Do learning facilitators in each learning environment

(for example, parents, guardians, teachers, educators, individuals in the community) have the knowledge, skills and capacity to support young people in their learning?

- **Relationships and activities:** Do young people have relationships and access to activities that are conducive to their wellbeing and learning?

Key Findings

There is no single agreed-upon definition of a learning ecosystem. We identified more than 15 definitions of the term. Some referenced the specific stakeholders involved in a learning ecosystem while others cited a general philosophical approach to learning. Drawing on Innovation Unit's (2019) report, *Local Learning Ecosystems: Emerging Models*, we have developed our own definition of a learning ecosystem: **A diverse, collaborative and dynamic network of stakeholders that enables greater access to a range of learning opportunities and helps young people achieve positive learning and wellbeing outcomes.**

Learning ecosystems are made up of diverse groups of stakeholders across a variety of settings. While each learning ecosystem is unique, all consist of a similar set of stakeholders and institutions. Some of these stakeholders and institutions are more formally linked to the traditional education sector than others, but regardless of whether they engage with each other in a classroom or a more informal setting, all act as education providers or learning agents. Stakeholders generally include students and young people, parents, teachers, community members, business operators and policymakers. Institutions typically include schools, cultural and arts institutions, youth organisations and charities, the private sector and government agencies. Importantly, the conceptual framework of a learning ecosystem expands the idea of

where learning can and does occur (traditionally confined to the school setting) to encompass a wider variety of environments (including the home and community) which influence the healthy development of children and young people and contribute to their positive educational and wellbeing outcomes.

Learning ecosystems are primarily local entities that can bring together a range of actors to address place-specific challenges or achieve goals. Like a biological ecosystem, such as a rainforest or Arctic tundra, learning ecosystems are inherently local—they are made up of a set of actors who are specific to a particular location and are often intent on solving context-specific challenges. Stakeholders and institutions within a learning ecosystem often unite over a shared purpose around which they are organising their efforts. For some, this could be to generate more opportunities for disadvantaged student populations; for others it could be to better support young people navigating rapid social and technological change. However, the existence of a common goal is a shared element across case studies.

Measuring the effectiveness of learning ecosystems depends, in part, on what we decide learning is for. To identify the intended outcomes of an effective learning ecosystem we must first ask: what do we want young people to be able to do, have or feel when they enter into adult life? The answer to this question is up for debate and is likely to depend on the specific stakeholder engaged. For example, the views of young people are likely to differ drastically from those of an economist, policymaker or even parent. Whole-systems thinking also encourages us to look at various outcomes related to others within the ecosystem, such as the learning facilitators, as part of the long-term sustainability of the system itself. According to Urban Institute (2016), outcomes could include

youth learning outcomes (self-directed learning or life skills such as perseverance, confidence and hope); youth opportunity outcomes (access to employment or further education); and learning ecosystem outcomes (stable funding or equitable access to education).

There has been little research on how best to map and evaluate learning ecosystems at the national level. To date, almost all the mapping, measurement and evaluation of learning ecosystems has occurred at the local level. As such, there is still debate about which factors best enable effective learning

ecosystems. Global Education Futures (2020) identifies the “CORE enablers” of learning ecosystems at the local level, which it divides into four categories: *Cultural factors* (eg, values, relationships and communication and norms); *Organisational protocols and structures* (eg, key stakeholders, distributed leadership and feedback loops); *Resources* (eg, funding, space and skills and capacity); and *Execution* (eg, inclusive planning and design, collaboration and co-creation). Similar types of categorisation could be used as the basis of a national framework measuring the enablers of learning ecosystems.



The state of education: Summary of trends and challenges

This section explores some of the limitations within traditional education systems and processes, as well as the major trends influencing how, and with what goals, learning is being delivered to students. These factors underscore the need to enhance educational frameworks and national curricula in order to equip students with the skills required to make them employable, adaptable and resilient in a world of ongoing transformation.

Key challenges in education

An outdated and hyper-standardised model.

Since the early 20th century, education systems have massively expanded across the globe and schools have become the primary mechanism through which young people acquire new knowledge and skills (Brookings Institution, 2015). This expansion was accompanied by a standardisation process where teachers are expected to deliver a set curriculum and success is measured using a universal set of metrics such as national examinations (Burns and Köster, 2016). As a result of such efforts, we have a society which has never been more educated (OECD, 2017c). However, critics of this model—referred to by some as “industrial education” (Global Education Futures, 2020)—argue that it: makes limiting

assumptions about the way knowledge is, and should be, transferred (eg, from external sources such as teachers, books, and school); has narrow measures of “success” based on proficiency in a select number of subjects; creates passive learners through its emphasis on lecturing and memorisation; and reduces learning pathways through its standardisation of experiences, tasks and time conventions (Robinson, 2010; Aspen Institute, 2014).

The limits of standardised testing. The use of large-scale standardised tests in education systems is a widespread practice. While the data generated by these tests can offer valuable evidence to help identify areas for improvement, while increasing transparency and accountability (Burns and Köster, 2016), a number of concerns regarding the shift towards test-based accountability have been raised by scholars, particularly in the US. For instance, a number of unintended consequences of accountability policies that emphasise testing have been highlighted by scholars, include a narrowing of the curriculum to focus on “tested” subjects (Dee et al., 2013); redirection of teaching efforts to prepare students for tests (Supovitz, 2009); and impacts of segregation due to, for example, parents opting to place their children in higher-ranked schools (Davis et al., 2015). Furthermore,

anxiety regarding tests and assessments has been highlighted as a major factor contributing to student stress (OECD, 2017c).

Inequality in education is a global issue.

A rights-based approach to education and the proliferation of mass schooling have been instrumental in expanding the access and quality of education for millions of children (Brookings Institution, 2015). However, inequalities persist globally. For instance, the Brookings Institution (2015) found that the developing world is 100 years behind the education levels achieved in developed countries in terms of children's school enrolment, the number of years of school adults have completed, and children's learning outcomes in literacy, numeracy and science¹. In the UK, the Education Policy Institute estimated that it would take around 50 years to close the attainment gap between disadvantaged pupils² and their peers by the time pupils take their GCSEs (Andrews et al., 2017).

Teachers are undervalued, unfulfilled, and underpaid. In many societies, education professionals do not feel valued or enjoy a high social status (OECD, 2013; Varkey Foundation, 2018). The Global Teacher Status Index found that, relative to other professions, perceptions of the teaching profession are low and it is not comparatively well paid (Varkey Foundation, 2018).³ Poor working environments and heavy workloads for teachers are also cause for concern. The Talis

Global Survey (OECD, 2018) found that 77% of teachers feel that they are working in an innovation-hostile environment, while 81% of teachers in England and Wales reported that they have considered leaving the profession during the past year due to unmanageable workloads (National Education Union, 2018).

Learners are disengaged and wellbeing is low.

The Varkey Foundation (2017) reports that less than a third of young people from 20 countries reported good overall emotional wellbeing⁴ and nearly half feel pressured by school. World Skills (2019) highlighted that only 20% of young people value their education, while the OECD (2018) found that about a third of 15-year-olds across OECD countries reported having no clear sense of meaning in their life. By 15, many young people have spent a significant amount of their life in the school setting (about 10,000 hours) and, as Hannon and Peterson (2021) succinctly put it, this is "a lot of time to spend not working out what you care about."

Trends impacting education

Climate change. The climate crisis is posing severe and unprecedented challenges to our societies and the planet. However, some see education systems as uniquely placed to foster the right type of skills, attitudes and behaviour in younger generations to promote a more sustainable lifestyle (HundrED, 2018). Furthermore, young people expected to graduate

¹ A limitation noted in this study is the lack of "good measures" to assess a broader variety of skills and competencies, such as problem-solving and perseverance, which have also been highlighted as important measures for evaluating how successful education systems are.

² In this study, disadvantaged students were defined as those eligible for the Pupil Premium (funding provided to improve education outcomes for students who meet specific criteria such as eligibility for free school meals, students who have been adopted from care, or students who are looked after by the local authority).

³ Exceptions to this are in China, Russia and Malaysia, where teachers are thought to be most similar to doctors as a professional occupation.

⁴ Emotional wellbeing was measured as a young person who admits to not thinking about their problems too much and does not feel anxious, bullied, unloved or lonely.

from school over the next decade are poised to take the estimated 24 million new jobs that could be created globally by 2030 if we shift to a greener economy (United Nations, 2019b). The evidence suggests that youth are interested in taking advantage of such opportunities—the UK Department for Business, Energy & Industrial Strategy (2018) found that almost two-thirds of youth surveyed would “prefer” a job in the green economy rather than one outside it.

Changing demographics. Urbanisation, migration and globalisation, increasing longevity, and greater gender parity are just some of the demographic trends highlighted for their potential to influence education priorities (Global Education Futures, 2018a). For instance, sub-Saharan Africa and parts of Asia and Latin America have experienced growth in the working age population due to reduced fertility which has enabled more women to enter and remain in the workforce, generating a population age distribution that is favourable to accelerated economic growth (United Nations, 2019a). The United Nations (2019a) has suggested that governments take advantage of this “demographic dividend” by creating conditions that enable sustained economic growth through investments in education and health for youth populations.

Connectivity and digitalisation. Increased internet access and digitalisation, alongside new digital environments—mobile apps, social networks, online games and participatory websites—have fundamentally altered the ways we learn, study, communicate and relate to each other (Global Education Futures, 2018). The impact and potential of these forces to shift the way in which education is conceived of and delivered are profound, from a wider reach to novel sources of knowledge

to instantaneous connections between peers, teachers and mentors, both locally and globally.

Automation, robotisation and tech. The growth and application of autonomous systems, robotics, improvements in 3D printing and other additive technologies have disrupted entire industries (Global Education Futures, 2018), with profound implications for the future role of human labour. For instance, some estimates suggest that 28% of young workers’ jobs in the UK could be at risk of automation by the early 2030s (PwC, 2017b). Despite such developments, only 16% of CEOs surveyed by PwC (2017a) planned to cut their company’s headcount in the next year, with respondents highlighting the skills that machines cannot replicate—including creative, innovative leadership and emotional intelligence—as those which are most sought after. Yet, 77% of CEOs are concerned that key skills shortages could impair their company’s growth. Young people share these worries. Deloitte’s 2021 survey found that only 36% of millennials feel they have the knowledge and skills they need to thrive in an evolving economy.

Covid-19 has caused enormous “disruption” to education systems on a global level. The United Nations (2020) found that 94% of the student population was affected by closures of schools and other learning spaces due to the pandemic, while UNESCO (2021b) estimated that nearly 20 years of educational gains were wiped out in some areas and that over 100 million children will fall below minimum reading proficiency levels due to learning disruptions. Although most schools have now reopened, concerns remain in terms of the impact on student health and wellbeing, drop-outs, and addressing learning losses (Rao and Rao, 2021). Furthermore, covid-19 and the so-called “digital divide”⁵ have

⁵ The digital divide refers to the economic, educational and social inequalities between those who have access to digital devices, infrastructure and resources and those who do not.

been cited as factors exacerbating existing inequalities (Inter-American Development Bank, 2020; Coleman, 2021). For example, at least one-third of children were challenged in accessing learning remotely due to limited connectivity and access to devices (UNESCO, 2021a). Despite these challenges, the massive efforts from teachers, administrators and governments in

a short time to deliver learning to children in new ways during the pandemic remind us that change is possible (United Nations, 2020). As the United Nations (2020) states, “we should seize the opportunity to...reimagine education, accelerate change in teaching and learning... and bring about a set of solutions previously considered difficult or impossible to implement.”



What do today's children need to succeed in tomorrow's world?

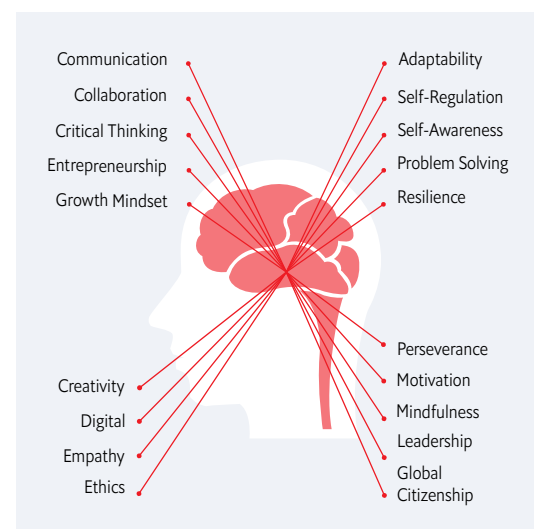
A growing body of evidence suggests the importance of a range of competencies or sets of skills, beyond literacy and numeracy, for fostering personal and social development and achieving positive outcomes in school and life (UNICEF, 2021; OECD, 2019; Lippman et al., 2015). These are enshrined at the international level within Sustainable Development Goal 4, which identifies literacy and numeracy skills alongside technical and vocational skills, high-level cognitive and transferable skills, and skills promoting sustainable development as targets for all children and youth under the agenda for sustainable development by 2030.

21st-century skills

21st-century skills (Knowledge, Evidence and Learning Development, K4D, 2019) or competencies (OECD, 2019) are generally described as those which help children build a structure of productive and healthy lives and adapt to an increasingly changing world, are applicable to a variety of life situations, and support life-long learning (UNICEF, 2017; HundrED, 2021). However, discussions about such skills are often complicated by inconsistent terminology and variation in the specific range of skills identified by various frameworks or stakeholders (K4D,

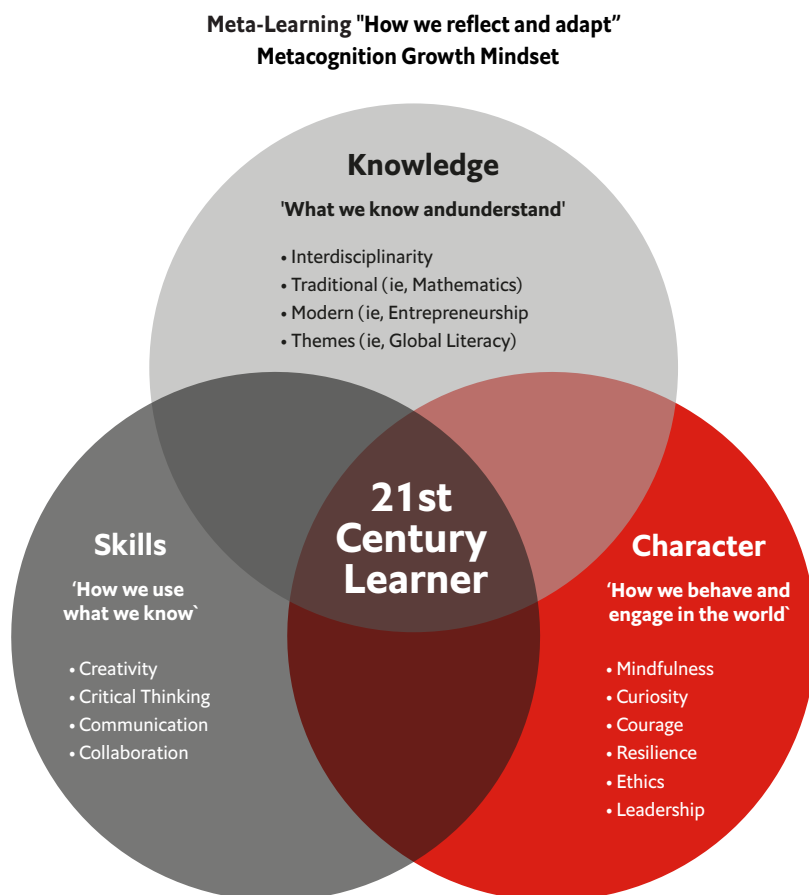
2019). For instance, commonly used terms include: "21st-century skills", "life skills", "soft skills", "transversal skills", "critical skills", and "employability skills". Deviations in terminology and skill selection often depend on the research discipline, development context, and/or goals of various stakeholders (Lippman et al., 2015). There is also some variation in approach in considering how technology-driven skills should fit into skills frameworks (K4D, 2019).

Figure 1. 21st-century Skills



Source: HundrED (2021)

Figure 2. Four-dimensional Framework of the goals of education



Source: Center for Curriculum Redesign (2020)

One popular framework proposed by the Partnership for 21st Century Learning (2007) highlights the “4Cs” (Critical thinking, Communication, Collaboration and Creativity) as the crucial attributes to be developed within the context of teaching core subject areas.

Skills are also often divided into types or categories such as UNICEF’s four-dimensional model identifying the 12 core life skills for the Middle East and North Africa region (2017):

1. Skills for learning: creativity, critical thinking, problem-solving.
2. Skills for employability: cooperation, negotiation, decision-making.
3. Skills for personal empowerment: self-management, resilience, communication.
4. Skills for active citizenship: respect for diversity, empathy, participation.

Similarly, the OECD (2019) Future of Education and Skills 2030 Framework distinguishes between three types of skills that highlight the competencies that are “increasingly recognised as essential for thriving in the 21st century”:

1. Cognitive and meta-cognitive skills, which include critical thinking, creative thinking, learning-to-learn and self-regulation.
2. Social and emotional skills, which include empathy, self-efficacy, responsibility and collaboration.
3. Practical and physical skills, which include using new information and communication technology devices.

Importantly, the OECD’s approach emphasises that we should move beyond thinking in terms of “just skills”. They highlight a broader number of “core foundations” or “competencies”, including *skills*, but also the foundational *knowledge, attitudes and values* they cite as “prerequisites for further learning” (OECD, 2019).

To address the challenges of inconsistent terminology and approach, various efforts to synthesise existing frameworks have taken place. For instance, Harvard’s Explore SEL project is designed as a navigator for the field of social and emotional learning, helping to connect the major frameworks and skills in the field. Similarly, the Center for Curriculum Redesign’s Four-Dimensional (4D) framework “is a highly researched synthesis of more than a hundred frameworks from around the world” (Figure 2) aiming to represent the commonly accepted goals of an education: Knowledge + Competencies (it defines competencies as skills + character + meta-learning dimensions) (Center for Curriculum Redesign, 2020).

Key influences on development and learning

To design meaningful education policy and curricula for the 21st century, it is critical to understand the many factors in promoting positive educational outcomes for children. A large number of studies and reviews illuminate the various relational, instructional and environmental factors as well as the cognitive, emotional and social processes influencing children’s development and ability to learn. By no means a complete list, the following summarises some of the relevant literature on this subject:

The motivations and aspirations of young people can influence outcomes.

The motivations and aspirations of students have been linked to positive academic performance, while lack of motivation can result in lower performance (Özen, 2017; Walkey et al., 2013). Interestingly, research has also indicated that children’s educational aspirations can diminish with age and may result from greater awareness of circumstances or barriers to success (Morrison Gutman and Akerman, 2008).

A positive home environment and relationships impact success.

Positive, trusting and supportive relationships—including among families but also teachers, mentors, etc—provide an important foundation for children to form positive social connections, build good emotional health, and develop as effective and adaptable learners (Osher et al., 2020). Parental involvement in learning is also important, particularly for younger children. For example, children with parents who frequently read to them show higher levels of emergent literacy scores (OECD, 2021). A home environment where books and toys are present has also been linked to early literacy development (Law et al., 2009).

Some studies have explored the influences of household income and socioeconomic status on children's academic outcomes and cognitive development, including gaps arising from lack of investment in educational resources and lower parental involvement (Neumann, 2016; Akee et al., 2010; Letourneau et al., 2011).

Adverse childhood experiences (ACEs) affect focus and engagement. ACEs⁶ can have a profound impact on a child's development and social, emotional and academic outcomes (Darling-Hammond et al., 2020; Golombok and Tasker, 2015). For example, greater levels of conflict and discord between parents has been associated with behavioural problems and child maladjustment (Goldberg and Carlson, 2014). ACEs can impact the ability of children to focus in school and remain engaged, while "chronic stress can have a negative effect on the chemical and physical structures of a child's brain, causing trouble with attention, concentration, memory, and creativity" (Darling-Hammond et al., 2019).

High-quality early childhood education and care (ECEC) environments can reduce disparities. Children's participation in high-quality⁷ ECEC services has been shown to favourably impact the development of verbal and language skills at school-entry level. Improved outcomes for certain disadvantaged groups, including low-income children and children with special needs, have also been noted to arise from involvement in quality

ECEC services (OECD, 2021). One recent review highlighted that the "structural and social features of early childhood educational settings can offer a developmentally rich context and can enhance developmental range, buffer the effects of stress and trauma, promote resilience, and accelerate the development and integration of affective, cognitive, social, and emotional processes" (Osher et al., 2020).

A welcoming and inclusive school climate. Various studies underscore the benefits of a positive school climate, including improvements in academic achievement overall, as well as improved grades, test scores, and engagement for low-income students (Darling-Hammond et al., 2019). One of the core elements of school climate contributing to positive academic outcomes for students is positive teacher-student relationships, including warmth, acceptance and teacher support (Darling-Hammond et al., 2019). However, the benefits of such positive relationships and school climates extend beyond academic learning and cognitive outcomes, also impacting a range of socio-emotional outcomes, including motivation, interest, and educational aspirations and ambitions (OECD, 2021).

Extended learning time and out-of-school-hours (OSH) services are important. A body of research demonstrates the benefits of a wide range of OSH enrichment and the extended learning opportunities (eg, tutoring, mentoring,

⁶ ACEs are defined by the Center for Disease Control (2022) as potentially traumatic events that occur in childhood (0–17 years). For example: experiencing violence, abuse or neglect, or witnessing violence in the home or community. Also included are aspects of the child's environment that can undermine their sense of safety, stability and bonding, such as growing up in a household with, for example, substance use problems or mental health problems. However, these examples are not exhaustive and many other traumatic experiences could impact health and wellbeing.

⁷ The OECD (2021) has noted the importance of both the "structural" quality of ECEC (eg, child-staff ratios, staff pre-service qualifications, and staff participation in in-service training) and the "process" quality (eg, the quality of the processes and interactions that affect children's everyday experiences such as the sensitivity of teachers to children's emotions and behaviours, as well as individual needs, collaboration between staff members, and collaboration between staff and parents).

engaging in music, art and sports activities) for students (Darling-Hammond et al., 2019; OECD, 2021). For example, a report from the US describes how participation in these types of activities can impact the motivation of students and contribute to improved cognitive outcomes, especially among low-income children (Bartko et al., 2020). However, the quality of OSH services, and therefore the positive impacts of participating in them, can vary significantly between countries and contexts (OECD, 2021).

Play can be a powerful mechanism for development. The LEGO Foundation (2017) undertook an extensive review of the current evidence on the role and importance of children’s learning through play. They found that “playful experiences” are not only supportive of children’s health and happiness in early years, but also a key mechanism for engendering the skills to be “creative, engaged, lifelong learners of tomorrow”.⁸

Neighbourhood quality and access to nature. The quality and features of a child’s environment, including the level of safety and prosperity, as well as the built features and facilities (eg, walking or cycling paths, recreational facilities) are linked to greater levels of physical health and social and emotional wellbeing (OECD, 2021). Access to green spaces such as parks and gardens is also salient. Evidence collated by UNICEF (2021) suggests that access to natural environments can have a positive influence on a number of abilities and outcomes for children, including their working memory, learning outcomes, problem-solving, decision-making and creative thinking.

Public spending on education matters. The level of public spending on education by local and national governments can have an impact on improving educational outcomes (OECD, 2021). For example, school finance reforms and greater investment in disadvantaged districts in the US resulted in increased educational achievement among low-income school districts (Lafortune et al., 2018), while textbook subsidies for low-performing elementary-age students have been linked to an increase in test scores (Holden, 2016).

The expansion of empirical evidence on the impact of these factors has resulted in a shift in the way many are thinking about, approaching and evaluating educational and wellbeing outcomes for children. For example, the Learning Policy Institute in the US calls for a “whole child approach” to education, encouraging schools and educational institutions to “use effective, research-based practices to create settings in which students’ healthy growth and development are central to the design of classrooms and the school as a whole” (Darling-Hammond and Harvey, 2018). Similarly, the OECD’s WISE Centre recently developed a conceptual framework for measuring child wellbeing that seeks to “overcome a common shortcoming in child wellbeing measurement: treating the different dimensions of child wellbeing—material wellbeing, physical health, social, emotional and cultural wellbeing, and cognitive development and educational wellbeing—as if they are separate or independent from one another. Wellbeing needs to be understood as a whole because its dimensions develop alongside one another” (OECD, 2021).

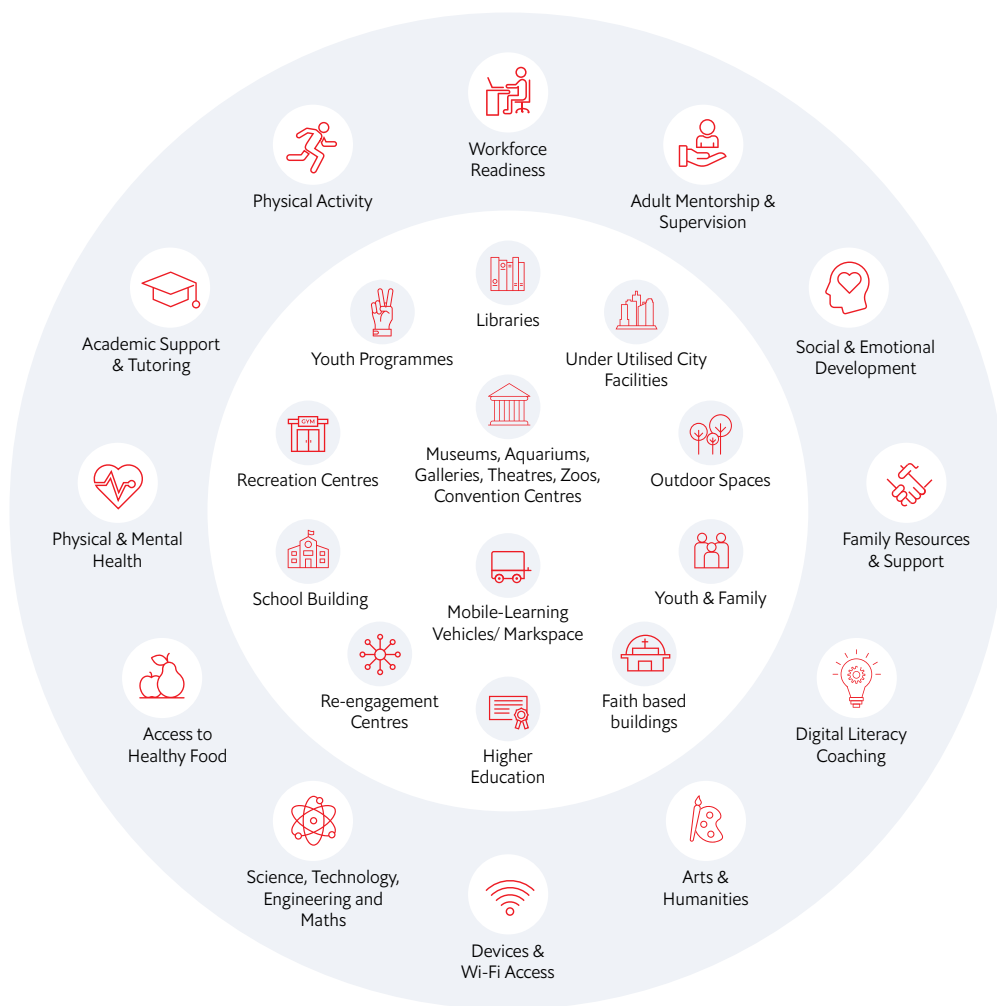
⁸ The study recognises that “more work is needed to discover the mechanisms by which child play engages with learning outcomes, and what happens as children grow older.”

Transforming education through learning ecosystems

Around the globe, policymakers, academics, and thought leaders are working to reform systems and “re-imagine” new approaches to learning and education for the 21st century. The primary purpose of this reimagining is to ensure that systems are better equipped to provide children with the skills and experiences they need to lead happy, successful lives in a rapidly changing world. One such approach that is gaining traction among key stakeholder groups is learning ecosystems. This moves away from siloed and standardised systems of education, advancing the need for collaborative networks of educational providers and diverse stakeholders to create new and more personalised learning pathways for students, both within and beyond school walls. Whole-systems thinking and greater collaboration among traditional and non-traditional actors in this space also provide novel opportunities to better align goals and outcomes for education with the needs and interests of societies.



Figure 3. Visualising a learning ecosystem, from the National League of Cities



Source: WISE and the Qatar Foundation, 2021)

Defining learning ecosystems (or moving towards a definition)

Although ecosystemic thinking about schools and learning environments began to appear in educational discussions in the mid-2000s, an explicit or consistently applied definition is absent in the literature (see Appendix II; Global Education Futures, 2020). Even the term “learning ecosystem” itself is used inconsistently,

or exchanged for similar terminology (eg, education ecosystems or innovation ecosystems) to explain the same or related concepts. Furthermore, some definitions are fairly vague or broad in application. For example, the OECD (2017a) describes learning ecosystems as “interdependent combinations of different species of providers and organisations playing different roles, in differing relationships with learners over time and in varying proportions”.

In exploring how leaders and practitioners define learning ecosystems, Global Education Futures (2020) states that definitions often refer to ecosystem “elements” such as its core or structural dimensions, qualities, values, actors and outcomes. For example, Díaz-Gibson et al. (2020) define learning ecosystems as *“social infrastructure formed by diverse actors that share a purpose, and engage in collaboration to co-design and co-implement innovative responses to existing social and educational challenges”*. Similarly, the Aspen Institute (2014) refers to learning ecosystems as *“connected learning”, which is “socially embedded, interest-driven and oriented toward educational, economic or political opportunity”*. The common element running through the various definitions of learning ecosystems, according to Global Education Futures (2020), is that the overarching education ecosystem “provides a purpose that our learning experiences are required for life”.

Part of the challenge in defining and understanding learning ecosystems lies in the complexity of the ecological approach. The notion of ecosystems originates in the study of evolutionary biology, where ecosystems are defined as “a biological community of interacting organisms and their physical environment”. Drawing on this, the concept of a human ecological system was first conceptualised by Urie Bronfenbrenner (1979), who posited various levels within this system, exerting their influence both horizontally and vertically, to effect human and child development. In this approach, schools and other learning settings can be explored from the range of relationships, interactions and activities between learners, education professionals and schools, as well as a wider range of social partners and related networks that organically interact with and impact each other (OECD, 2017a). This thinking encourages greater acknowledgement of the

various environmental and relational factors impacting educational and child wellbeing outcomes more generally, as highlighted above.

Key elements and dimensions of learning ecosystems

As learning ecosystems have evolved as a concept and emerged in practice, various researchers and organisations have attempted to map out their core elements and qualities. In *An Ecosystem for Research-Engaged Schools*, Godfrey and Brown (2019) draw heavily on ecological systems theory, outlining the ecosystem model as applied to the school system:

1. **The macrosystem** consists of the overarching beliefs and values in society that affect the school system, such as the belief that parents should be able to choose their children’s schools and that schools need to be measured, ranked and held accountable for outcomes.
2. **The exosystem** is the concrete manifestation of the macrosystem. This might include government policy, such as increasing school autonomy, as well as the indirect environment, such as networks or other organisations that connect to the school.
3. **The mesosystem** is the interaction between elements of the microsystem with the immediate environment, specifically the “workings” of a school as an organisation or institution.
4. **The microsystem** is the immediate educational environment of the child, especially the child as “learner” in the classroom, their relationships with teachers and other staff, peers and parents.

5. **The chronosystem** reflects the pace of change or development at each sub-level of the ecosystem. Attempts to improve or change teaching practice can be scrutinised or set within the context of often rapid policy changes introduced by new governments, eager to force through reforms to the school system.

The authors use this framework to highlight three key issues:

1. The need to connect all school change ultimately to the intended educational impact on children, and by corollary to society;
2. The need to ensure that elements of the system—especially at the individual-school level—are not viewed reductively or in isolation; and
3. The need to view system change as both interconnected and working in patterns of multidirectional cause and effect.

Such an understanding, including efforts to place the learner/child at the centre of policy and system design, is echoed across the learning ecosystem literature (OECD, 2017b; Remake Learning, 2015).

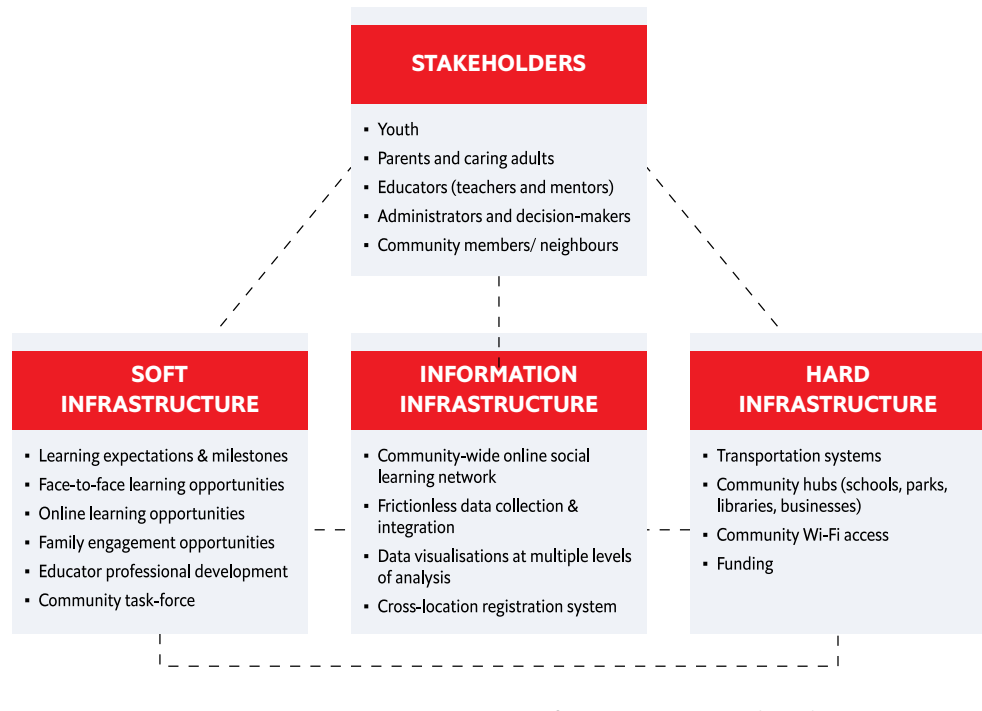
Another core element of learning ecosystems is expanding the spaces where learning occurs and a personalisation of learning pathways, often supported by technology (KnowledgeWorks, 2014). This approach requires a shift in how both education and the actors and institutions that deliver it are conceived of. Learning should not be viewed as something that happens in select spaces and time periods (eg, in school), but as an ongoing process unfolding in the home, in play spaces, and in a multitude of other settings, delivered by a variety of learning agents (Remake Learning, 2015). Structurally, this calls for (re)designing and expanding the spaces and platforms available for learning, both within the

traditional school-based settings, but also in other “informal” settings such as online settings, or blended settings, with a mixture of online and other traditional settings. In turn, a greater range of education options and environments would allow learners more flexibility to participate in opportunities based on their interests, needs and goals (KnowledgeWorks, 2014).

In her research exploring the components of a healthy learning ecosystem, Pinkard (2019) argues that advances in new technologies, reduction in size and cost of internet-connected devices, and increased access to free WiFi in community spaces have fundamentally altered the way we can access, connect to and communicate learning, and shifts the function of the school away from a siloed institution towards an “essential critical hub” that can help facilitate various learning opportunities for children and parents in formal and more informal settings. She presents the following conceptual framework as a tool for understanding learning ecosystems, comprising three infrastructure components:

1. **Hard infrastructure:** including physical school buildings, along with transportation systems, internet access, and community learning hubs such as parks, libraries and businesses.
2. **Soft infrastructure:** common understanding and agreement about learning expectations and milestones, offerings in school, out of school, and online learning environments, learning opportunities for parents and educators, and opportunities for community participation in decision-making and implementation.
3. **Information infrastructure:** community-based social learning networks, frictionless data collection and integration, and features and data visualisations that can support stakeholders in making decisions about use and design of soft and hard infrastructure.

Figure 4: Healthy learning ecosystem framework

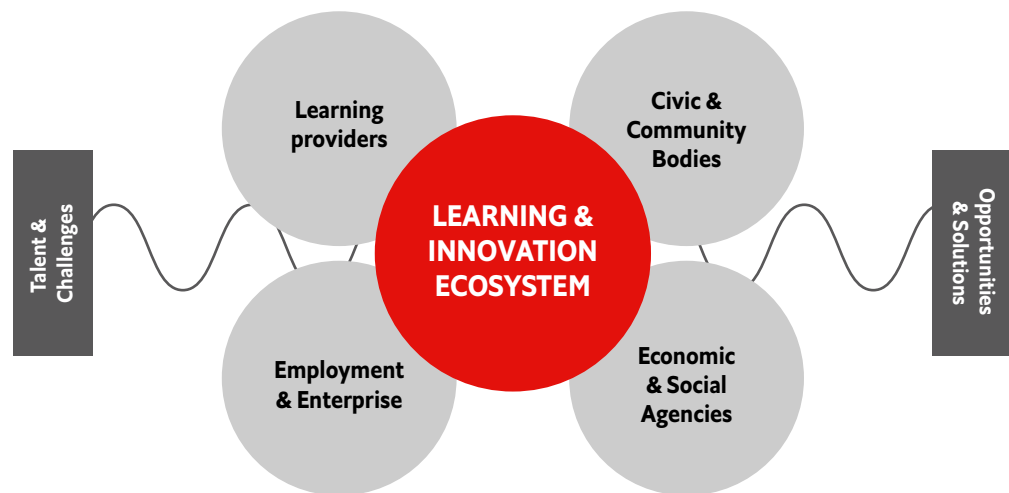


Source: Pinkard (2019)

Another important dimension to learning ecosystems is the ability they offer to keep pace with a rapidly changing world by better aligning educational priorities with the interests of societies and shifting labour market dynamics. This approach promotes the growth of networks and “horizontal connectedness” (OECD, 2017b) across multiple sectors and systems, which offers real-time insight into the needs and interests of the respective stakeholders and allows educational experiences to be

tailored in response. Stevenson and Boxall (2018) study these networks, describing a heightened level of engagement between universities with their external communities as the “Fourth Dimension”. They explain that this mode of engagement extends beyond institution-centred interactions to develop local or regional responses to economic and social challenges. Figure 5 presents a visualisation of a learning ecosystem and its dynamic and interacting parts.

Figure 5. Schematic of local learning and innovation ecosystems



Source: Stevenson and Boxall (2018)

The authors consider a number of case studies where universities are already employing this approach, and provide a common group of features observed across the group:

1. **Focus:** communities had shared interests in securing innovative solutions to local needs, problems or opportunities.
2. **Partnership:** established structures and processes enabled a diverse community of stakeholders to work together to align their interests and coordinate their contributions to create solutions and outcomes that none of them could achieve on its own.
3. **Innovation:** learning ecosystems provided a context for the group members, including formal institutions, to learn together how best to grow their collective understanding and capabilities (eg, development of new models of individual and collective learning and hands-on approaches to problem-solving).

Learning ecosystems may also promote the use of novel credentialing systems, assessments and/or technology platforms which aim to replace or sit alongside the more standard modes of tracking achievement and assessments (eg, graduation, tests) (Hannon and Peterson, 2021; KnowledgeWorks, 2014). For example, the Cities of LRNG initiative, which operates in more than 15 US cities, aims to maximise “connected learning” by fostering local learning ecosystems that offer innovative academic and career pathways to young people, primarily from disadvantaged backgrounds. This ecosystem model is underpinned by the collaboration and networks of diverse stakeholders, including local government actors, business leaders, public libraries and community colleges, to expand access to a variety of OSH learning opportunities and experiences. Using an online platform, youth earn digital badges that certify their efforts and are linked to opportunities such as micro-scholarships and internships (Urban Institute, 2016).

The “qualities” characterising an ecosystemic approach to learning are captured in the nine case studies of emerging models used in the research from Innovation Unit (2019). These include:

1. Diversifying learning resources and pathways for learners;
2. Activating and sharing resources for learning in new ways from diverse sources;
3. Being dynamic in composition and porous around the edges;
4. Supported by helpful infrastructure (including digital technology);
5. Comprising formal and informal learning institutions, and tradition and new entrants;
6. Having distributed governance;
7. Being learner-driven or having learner agency at its heart; and
8. Making an attempt to meet 21st-century challenges in some way, beyond the narrow confines of academic attainment alone.

Learning ecosystem stakeholders

While an ecosystem naturally encompasses a broad set of actors within a given environment, there are a number of core stakeholders consistently identified in the literature or observed across case studies as important players in the development or design of learning ecosystems:

Students: in a learning ecosystem model, students are considered active agents or participants of their education, empowered to define preferred methods, pathways and outcomes based on their interests and personal goals (Aspen Institute, 2014).

Parents and families: as highlighted above, parents and the home environment play

a crucial role in a child’s development and later educational outcomes. Parents should be supported with guidance and resources for fostering good-quality relationships and helping their children build key skills and capacities (UNICEF, 2021; OECD, 2021).

Educators/providers of learning: an ecosystem approach moves beyond the traditional view of educators being teachers in a classroom and encompasses a broader group of providers or agents operating in a range of formal, informal and/or digital settings (see Appendix I).

Schools, districts and educational institutions: although there is emphasis on moving beyond schools and traditional educational institutions as the main facilitators of learning, these institutions continue to play a fundamentally central role in the learning ecosystem architecture. Not only are they centres for education, but they are also crucial in promoting more of an ecosystem approach to working and helping build important relationships and networks.

Cultural institutions, charities and other community bodies: these types of bodies (eg, libraries, museums, religious spaces and non-governmental organisations) are important for expanding educational experiences and as sites for learning. They can offer volunteer opportunities and internships, encouraging the growth of skills, cross-cultural understanding, and a culture of service learning and civic engagement (Pinkard, 2019).

Business and industry: businesses and industry leaders are not only capable of providing opportunities for learning (e.g., workplace learning, internships, apprenticeships), but also can offer on-going insights into the range and type of skills that employees most value (OECD, 2017a; Aspen Institute, 2015).

Investors and foundations: these can have an influential role in expanding learning opportunities and ecosystem collaboration. Strategic investment of contributions can directly impact learning institutions and facilitating organisations, and have an indirect impact through contributions to policy and advocacy or investment in other sectors and industries (Scott, 2021).

Government and policymakers: government and policymakers play an important role in triggering and steering education reform, developing objectives and guidelines, while also offering oversight of the implementation of goals (Burns and Köster, 2016). For example, they can ensure meaningful teacher credentialing, set curricular standards and establish accountability metrics (WISE and the Qatar Foundation, 2021; Scott, 2021).

Global Education Futures (2020) offers a useful categorisation of the multiple stakeholders needed in a learning ecosystem, making a distinction between “first-liner” and “second-liner” institutions:

1. **First-liner institutions** are organisations such as schools, universities, clubs, museums, communities and other providers of learning experiences that directly interact with a learner, ideally as an interconnected network.
2. **Second-liner institutions** are the “influencers” that set out objectives and operating constraints for learning providers, yet do not often engage in providing learning experiences themselves.

A typology of learning ecosystems

A number of researchers have examined existing ecosystems in various contexts, discerning a number of categories or types, often based on purpose, strategy and/or means of operating. For example, Innovation Unit (2019) highlighted four broad “categories” of learning ecosystems in its research findings, focusing more on the structural or operational aspects and the design of learning ecosystems:

1. **Expanded formal offers:** such initiatives work in tandem with existing curricula and/or outcomes and are typically led by a single institution or agency. They look to diversify learned experiences and outcomes, and bring in new partners.
2. **Industry- or community-led initiatives:** efforts led by groups typically considered as outsiders to the formal learning system (eg, industry sector), promoting learning pathways and opportunities linked to the needs of industry.
3. **New designs and new platforms:** ecosystems designed to involve multiple players that offer a high degree of learner agency. This approach provides a new model for organising learning, with potential for replacing existing education systems.
4. **Responsively dynamic:** this model includes a self-sustaining community of providers supporting and enhancing learning. Operating through distributed governance and funding, this type of ecosystem remains responsive to both learner demands and economic conditions. The researchers found no evidence of this type of ecosystem in practice.

Global Education Futures (2020) sets out five types of dynamics observed across dozens of learning ecosystem case studies:

1. Ecosystems that create conditions for social or cultural innovation and development;
2. Ecosystems that create conditions for increased just and fair opportunities in circumstances of gender, economic and ethnic inequality;
3. Ecosystems that support technological innovations and the development of teams of technological entrepreneurs and developers;
4. Ecosystems that become a layer of urban civic development and expand citizen opportunities for learning and wellbeing; and
5. Ecosystems that support regenerative economies in connection with respective bioregional ecosystems.

Outcomes of learning ecosystems

What are some outcomes of learning ecosystems? The Cities of LRNG initiative (Urban Institute, 2016), discussed above, developed a logic model as a foundation for operational and performance measurement planning and an evaluation planning tool, outlining short, intermediate and long-term outcomes of a learning ecosystem.

Outcomes have been separated in terms of *youth learning outcomes* (eg, stronger social and professional networks, civic engagement and technical expertise/mastery in their chosen profession; *learning ecosystem outcomes* (eg, stable funding for the local initiative and learning ecosystem, and equity, connected learning and digital pages integrated into education, workforces and other policies and programmes); and *youth opportunities outcomes* (eg, high-

school attendance rate, internships and jobs, and local workforces reflecting local talents and demographics) (Urban Institute, 2016).

While the above example provides some insight into the types of outcomes learning ecosystems are concerned with, there seems to be a lack of consensus about which outcomes we should be focusing on when we talk about education in general (eg, literacy and numeracy outcomes, youth employment and workforce outcomes, etc) (Hannon and Peterson, 2021). Such questions are fundamentally tied to the question asked by Hannon and Peterson (2021): “What is learning for?” This ostensibly simple query is likely to elicit drastically different responses when posed to students, parents, teachers, economists, politicians, etc. One push has been to look at outcomes concerned with the development of 21st-century skills or competencies (Hannon and Peterson, 2021). However, while education systems around the world are increasingly inclusive of a wider range of such skills in their national curricula, a lack of clear definitions, understanding about how these skills interact, effective approaches and tools for delivering these skills, as well as readily available measurement tools, limits the ability to capture the impact of such reforms (Center for Assessment, 2020; K4D, 2019).

Building a Learning Ecosystems Framework: Key Considerations

Are learning ecosystems inherently local?

Across the literature, learning ecosystems are primarily conceived of and have developed as local or regional entities, often rooted in and tied to the needs of the places where they operate. For example, KnowledgeWorks (2014) defines a learning ecosystem as “a network of relationships among learning agents, learners, resources, and assets in a *specific social, economic, and geographic context*.” Similarly, Innovation Unit (2019) found that the case study programmes included in its research consistently “emphasised the context specificity of their work...the relevance and power of new approaches to learning are bound up with their relationship to the historical, cultural, and industrial milieu in which they arise”. For example, Remake Learning (2015), a regional learning ecosystem started in Pittsburgh in the US, utilises the region’s post-industrial setting to create new learning opportunities and spaces to help school children navigate rapid social and technological change.

This is not to say that a learning ecosystem model cannot be developed, applied and adapted to disparate contexts. As noted above, the Cities of LRNG initiative has successfully implemented its model in various communities around the

US (Urban Institute, 2016). Neither does this mean that the influencers and actors operating at the national or societal level do not have a place in the learning ecosystem architecture. In fact, regional and central governments and dominant social norms are frequently highlighted as important forces promoting transformative policies and practices enabling the conditions for supporting and nurturing the growth of learning ecosystems (Godfrey and Brown, 2019; WISE, 2021). However, this distinction provides useful insights for the Learning Ecosystems Framework design. It may be helpful to reorient our approach to consider if and to what extent each country included in the research programme has an enabling environment for the transformation of education and the conditions allowing learning ecosystems (and their various components) to develop and thrive at local and regional levels.

Enabling an ecosystemic approach

Cultivating transformative learning ecosystems is likely to require broader systemic change and the enabling conditions for this to occur. However, meaningful change and reform in teaching and learning processes is a complex process. For example, an enduring challenge for policy is that it is notoriously ineffectual at changing behaviours at the microlevel (OECD,

2017a). Understanding educational reform as a top-down process is both an outdated vision and at odds with an ecosystemic approach. As the OECD (2017a) explains, “we need models that embrace the horizontal as well as the vertical, the non-formal as well as the formal, the unsponsored collaboration as well as the regulated.” For example, the ability of schools to form connections with the local economy is influenced by the ability to navigate regulatory frameworks, accountability systems and policy conditions (OECD, 2017a). Recognising these challenges and various levels of interaction has key implications for how education is governed, allowing innovation, and creating meaningful and lasting change.

Based on insights from ecosystem leaders, Global Education Futures (2020) identifies the “CORE enablers” of learning ecosystems divided into four categories: *Cultural factors* (eg, values, relationship and communication, and norms); *Organisational protocols and structures* (eg, key stakeholders, distributed leadership, feedback loops); *Resources* (eg, funding, space, skills and capacity); and *Execution* (eg, inclusive planning and design, collaboration and co-creation).

KnowledgeWorks (2014) also offers a helpful framework consisting of ten levers or pathways for “profound system transformation” falling across two categories (transforming the core of learning and transforming supporting systemic structures) to drive successful educational reform. The “pathways” in the first category target the day-to-day learning experiences of students, while those in the second category highlight the various conditions which, when present, most enable the learning ecosystem to meet the needs of all learners.

Transforming the core of learning:

1. Learning cultures: cultivate new personalised learning cultures

2. Learning structures: enable the development of diverse learning structures
3. Human capital: develop human capital for personalised learning ecosystems
4. Data infrastructure: develop a new, learner-focused data infrastructure
5. Assessment and credentialing: enable new forms of assessment and alternative credentialing

Transform supporting systemic structures:

1. Funding: establish equitable funding structures
2. Quality assurance: establish new quality-assurance frameworks
3. Community ownership: foster community-wide ownership of learning
4. Leadership and policy: foster courageous leadership and policymaking
5. Public will: cultivate public will and understanding for transformation

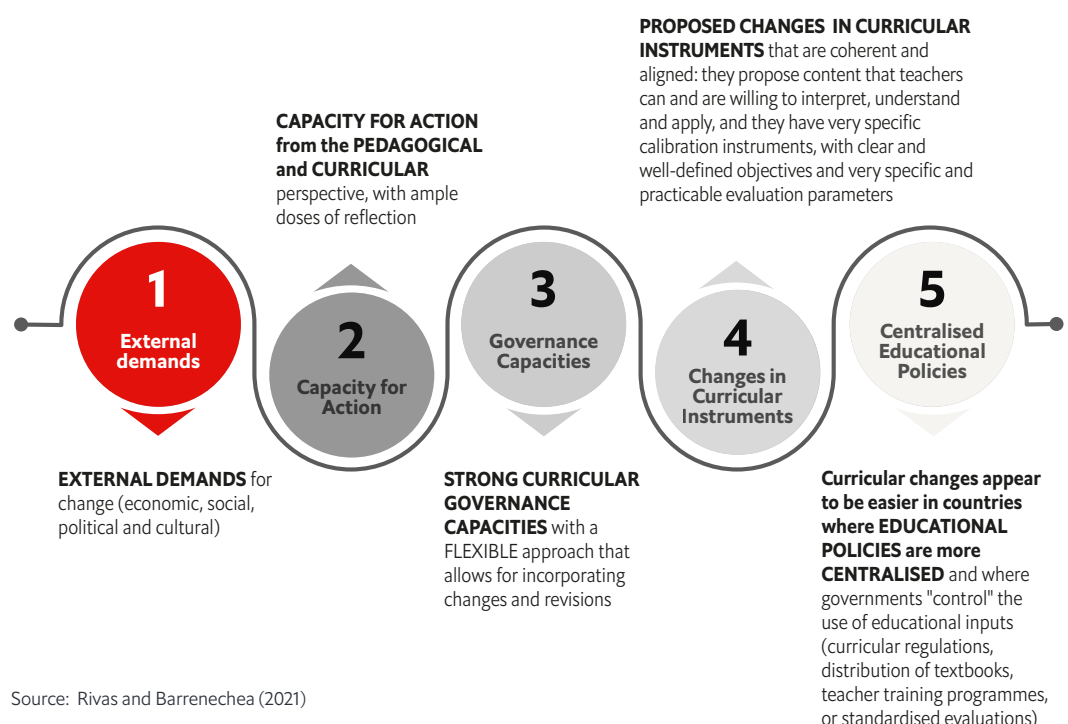
Research from the Inter-American Development Bank (2020) sets out the following actions that provide an enabling environment for the transformation of education and improvement in student learning and skills development. Although its focus is ultimately on maximising the role of technology in education, it sees this as embedded within the need for wider education reform to create systems which are flexible and adaptable to new circumstances:

1. **Make the reform about learning.** Every piece of the reform should keep learning at the centre.
2. **Invest in connectivity and narrow the digital divide.** Establishing connectivity and ICT infrastructure in schools is key to bridging the digital divide.
3. **Base the reform on a vision.** A vision is a goal that is contextualised and realistic. It is achieved over the long run, not under a particular administration.

4. **Define an implementation strategy and institutional architecture.** Set clear, realistic steps for implementation, including responsible actors.
5. **Ensure buy-in from all stakeholders in the education system.** Successful reform requires effort by members of the education community at every level.
6. **Change how students learn.** Updating and personalising pedagogical practices in traditional subjects, taking advantage of new technologies.
7. **Change what students learn.** Updating the curriculum based on the skills relevant for the 21st century.
8. **Empower teachers to become agents of change.** Reformers must offer opportunities for teachers to develop professionally. They must provide incentives for teachers to continue learning and improving on the job.
9. **Monitor and evaluate progress, and collect evidence for policymaking.**
10. **Address ethical issues.** Ethical issues surrounding technology and children (eg, personal data) should be considered.

Myriad factors impact the ability to introduce and govern reform, including: external forces on the educational system (economic, social, political and cultural); the allocated resources combined with the institutional capacity and competence of governments and educational organisations at the national and sub-national level; and the capacity of adaptation of the actors in the system to innovate and adjust to these changes, which in turn depends on their level of autonomy, training, etc. (HundrED, 2021). They posit that reform (in this example, curricular change for 21st-century skills) is more likely to succeed when the following factors are combined (Figure 6).

Figure 6. Curricular change is more likely to succeed when these factors are combined



Source: Rivas and Barrenechea (2021)

References

- Akee, R., Copeland, W., Keeler, G., Angold, G. and Costello, E. (2010). Parents' incomes and children's outcomes: A quasi-experiment using transfer payments from casino profits. *American Economic Journal: Applied Economics*. <http://dx.doi.org/10.1257/app.2.1.86>.
- Andrews, J., Robinson, D. and Hutchinson, J. (2017). Closing the Gap? Trends in Educational Attainment and Disadvantage. https://epi.org.uk/wp-content/uploads/2017/08/Closing-the-Gap_EPI-.pdf
- Aspen Institute (2014). Learner at the Center of a Networked World. *The Aspen Institute Task Force on Learning and the Internet*. <https://csreports.aspeninstitute.org/documents/AspenReportFinalPagesRev.pdf>
- Bartko, W., Sparr, M. and Filene, J. (2020). Providing an Essential Service: An Overview of Afterschool Program Support of Children's Social-Emotional, Behavioral, and Physical Health During Middle Childhood. *US Department of Health and Human Services*. https://aspe.hhs.gov/system/files/pdf/265236/2_MCASP_Overview_Brief.pdf
- Bronfenbrenner, U. (1979). The ecology of human development. *Cambridge, Massachusetts: Harvard University Press*.
- Brookings Institution (2015). Why wait 100 years? Bridging the Gap in Global Education. https://www.brookings.edu/wp-content/uploads/2015/06/global_20161128_100-year-gap.pdf
- Burns, T. and Köster, F. (Eds.) (2016). Governing Education in a Complex World, Educational Research and Innovation. <http://dx.doi.org/10.1787/9789264255364-en>.
- Center for Assessment (2020). Instructing & Assessing 21st Century Skills: Key Measurement & Assessment Considerations. <https://www.nciea.org/blog/educational-assessment/instructing-assessing-21st-century-skills-key-measurement-assessment>
- Center for Curriculum Redesign (2020). Theory of Change & Research Process. <https://curriculumredesign.org/wp-content/uploads/CCRProcessPaper-Jan152021.pdf>
- Centers for Disease Control (2022). Fast Facts: Preventing Adverse Childhood Experiences. <https://www.cdc.gov/violenceprevention/aces/fastfact.html>
- Coleman, T. (2021). Has Covid-19 highlighted a digital divide in UK education? *Cambridge University Press & Assessment Blog*. <https://www.cambridgeassessment.org.uk/blogs/has-covid-19-highlighted-a-digital-divide-in-uk-education/>
- Darling-Hammond, L. and Cook-Harvey, C. (2018). Educating the whole child: Improving school climate to support student success. *Palo Alto, California: Learning Policy Institute*. <https://learningpolicyinstitute.org/product/educating-whole-child>
- Darling-Hammond, L., Oakes, J., Wojcikiewicz, S.K., Hylar, M.E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C. Mercer, C. and Harrell, A. (2019). Preparing teachers for deeper learning. *Harvard Education Press*. <https://learningpolicyinstitute.org/product/preparing-teachers-deeper-learning-book>
- Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B. and Osher, D. (2020).

- Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24:2, 97–140, DOI: [10.1080/10888691.2018.1537791](https://doi.org/10.1080/10888691.2018.1537791)
- Davis, T., Bhatt, R. and Schwarz, K. (2015). School Segregation in the Era of Accountability. *Social Currents*. <https://journals.sagepub.com/doi/10.1177/2329496515589852>
- Dee, T., Jacob, B. and Schwartz, N. (2013). The Effects of NCLB on School Resources and Practices. *Educational Evaluation and Policy Analysis*. <https://journals.sagepub.com/doi/10.3102/0162373712467080>
- Deloitte (2021). The Deloitte Global 2021 Millennial and Gen Z Survey. <https://www2.deloitte.com/global/en/pages/about-deloitte/articles/millennialsurvey.html>
- Díaz-Gibson, J., Daly, A, Balslev, G. and Civiš Zaragoza, M. (2020). The SchoolWeavers Tool: Supporting school leaders to weave learning ecosystems. *School Leadership and Management*. https://www.researchgate.net/publication/341276687_The_SchoolWeavers_Tool_supporting_school_leaders_to_weave_learning_ecosystems
- Global Education Futures (2020). Learning ecosystems an emerging praxis for the future of education. <https://learningecosystems2020.globaledufutures.org/>
- Global Education Futures (2018a). Skills of the future: How to thrive in the complex new world. https://worldskills.ru/assets/docs/media/WSdoklad_12_okt_eng.pdf?platform=hootsuite
- Global Education Futures (2018b) Educational Ecosystems for Societal Transformation. <https://www.globaledufutures.org/educationecosystems>
- Godfrey, D. and Brown, C. (Eds.) (2019). An Ecosystem for Research-engaged Schools: Reforming Education through Research (1st ed.). *Routledge*. <https://doi.org/10.4324/9780203701027>
- Goldberg, J.S. and Carlson, M.J. (2014). Parents' Relationship Quality and Children's Behavior in Stable Married and Cohabiting Families. *Journal of Marriage and Family*. https://www.researchgate.net/publication/263670234_Parents_Relationship_Quality_and_Childrens_Behavior_in_Stable_Married_and_Cohabiting_Families
- Golombok, S. and Tasker, F. (2015). Socioemotional Development in Changing Families. *Handbook of Child Psychology and Developmental Science, 7th Edition*. <https://onlinelibrary.wiley.com/doi/pdf/10.1002/9781118963418.childpsy311>
- Hannon, V. and Peterson, A. (2021). Thrive: The Purpose of Schools in a Changing World. *Cambridge University Press, 2nd edition*.
- Harvard University. Explore SEL. <http://exploresel.gse.harvard.edu/>
- Holden, K. (2016). Buy the book? Evidence on the effect of textbook funding on school-level achievement. *American Economic Journal: Applied Economics*. <http://dx.doi.org/10.1257/app.20150112>
- HundrED (2021). Spotlight: 21st Century Skills in Latin America and the Caribbean. https://cdn.hundred.org/uploads/report/file/102/HundrED_Spotlight_21CenturySkills_EN.pdf
- HundrED (2018). Spotlight on Sustainability. https://cdn.hundred.org/uploads/report/file/3/hundred_002_spotlight_sustainability_digital.pdf
- Innovation Unit (2019). Local Learning Ecosystems: Emerging Models. https://www.wise-qatar.org/app/uploads/2019/05/wise_report-rr.1.2019-web.pdf
- Inter-American Development Bank (2020). What Technology Can and Can't Do for Education: A Comparison of 5 Stories of Success. <https://publications.iadb.org/en/what-technology->

[can-and-cant-do-for-education-a-comparison-of-5-stories-of-success](#)

Knowledge, Evidence and Learning Development (K4D) (2019). 21st Century Skills: Evidence of issues in definition, demand and delivery for development contexts. https://assets.publishing.service.gov.uk/media/5d71187ce5274a097c07b985/21st_century.pdf

KnowledgeWorks (2014). Innovating Toward a Vibrant Learning Ecosystem: Ten Pathways for Transforming Learning. <https://knowledgeworks.org/wp-content/uploads/2018/01/innovation-pathways-transforming-learning.pdf>

Koul, S. and Nayar, B. (2020). The holistic learning educational ecosystem: A classroom 4.0. *Higher Education Quarterly*. <https://doi.org/10.1111/hequ.12271>

Lafortune, J., Rothstein, J. and Whitmore Schanzenbach, D. (2018). School finance reform and the distribution of student achievement. *American Economic Journal: Applied Economics*. <http://dx.doi.org/10.1257/app.20160567>

Law, J., Rush, R., Schoon, I. and Parsons, S. (2009). Modelling developmental language difficulties from school entry into adulthood: Literacy, mental health, and employment outcomes. *Journal of Speech, Language, and Hearing Research*. <https://pubs.asha.org/doi/10.1044/1092-4388%282009/08-0142%29>

Lego Foundation (2017). Learning through play: A review of the evidence. https://cms.learningthroughplay.com/media/wmtlmb0/learning-through-play_web.pdf

Letourneau, N., Duffett-Leger, L., Levac, L., Watson, B. and Young-Morris, C. (2011). Socioeconomic status and child development: A meta-analysis. *Journal of Emotional and Behavioral Disorders*. <https://doi.org/10.1177%2F1063426611421007>

Lippman, L., Ryberg, R., Carney, R. and Moore, K. (2015). Key “Soft Skills” that Foster Youth Workforce Success: Towards a Consensus Across Fields. *Child Trends*. <https://www.childtrends.org/wp-content/uploads/2015/06/2015-24WFCSOftSkills1.pdf>

McKinsey (2021). COVID-19 and education: The lingering effects of unfinished learning. <https://www.mckinsey.com/industries/education/our-insights/covid-19-and-education-the-lingering-effects-of-unfinished-learning>

Morrison Gutman, L. and Akerman, R. (2008). Determinants of aspirations. Centre for Research on the Wider Benefits of Learning Research Report. <https://core.ac.uk/download/pdf/82863.pdf>

National Education Union (2018). NEU survey shows workload causing 80% of teachers to consider leaving the profession. <https://neu.org.uk/press-releases/neu-survey-shows-workload-causing-80-teachers-consider-leaving-profession>

Neumann, M. (2016). A socioeconomic comparison of emergent literacy and home literacy in Australian preschoolers. *European Early Childhood Education Research Journal*. <https://doi.org/10.1080/1350293X.2016.1189722>

OECD (2021). Measuring What Matters for Child Well-being and Policies. *OECD Publishing, Paris*. <https://doi.org/10.1787/e82fded1-en>

OECD (2019). Future of Education and Skills 2030 Concept Note. https://www.oecd.org/education/2030-project/teaching-and-learning/learning/learning-compass-2030/OECD_Learning_Compass_2030_concept_note.pdf

OECD (2018). Talis 2018 Results Volume III: What School Life Means for Students' Lives. <https://www.oecd.org/publications/pisa-2018-results-volume-iii-acd78851-en.htm>

OECD (2017a). Schools at the crossroads of innovation in cities and regions. *OECD Publishing, Paris*. <http://dx.doi.org/10.1787/9789264282766-en>

- OECD (2017b). The OECD Handbook for Innovative Learning Environments. *OECD*. <http://dx.doi.org/9789264277274-en>
- OECD (2017c). Most teenagers happy with their lives but schoolwork anxiety and bullying an issue. <https://www.oecd.org/education/most-teenagers-happy-with-their-lives-but-schoolwork-anxiety-and-bullying-an-issue.htm>
- OECD (2013). Talis 2013 Results: An International Perspective on Teaching and Learning. https://read.oecd-ilibrary.org/education/talis-2013-results_9789264196261-en#page1
- Osher, D., Cantor, P., Berg, J., Steyer, L. and Rose, T. (2020). Drivers of human development: How relationships and context shape learning and development, *Applied Developmental Science*, 24:1, 6–36, DOI: [10.1080/10888691.2017.1398650](https://doi.org/10.1080/10888691.2017.1398650)
- Özen, S. (2017). The effect of motivation on student achievement. *Karadag, E. (Ed.) The Factors Effecting Student Achievement, Springer*. https://www.researchgate.net/publication/317178099_The_Effect_of_Motivation_on_Student_Achievement
- Partnership for 21st Century Learning (2007). Framework for 21st Century Learning. http://static.battelleforkids.org/documents/p21/P21_framework_0816_2pgs.pdf
- Pinkard, N. (2019). Freedom of Movement: Defining, Researching, and Designing the Components of a Healthy Learning Ecosystem. *Journal of Human Development*. https://www.researchgate.net/publication/331884502_Freedom_of_Movement_Defining_Researching_and_Designing_the_Components_of_a_Healthy_Learning_Ecosystem
- PwC (2017a). 20 years inside the mind of the CEO...What's next? <https://www.pwc.com/gx/en/ceo-survey/2017/pwc-ceo-20th-survey-report-2017.pdf>
- PwC (2017b). PwC Young Workers Index. <https://www.pwc.co.uk/economic-services/YWI/pwc-young-workers-index-2017-v2.pdf>
- Rao, M. and Rao, D. (2021). The Mental Health of High School Students During the COVID-19 Pandemic. *Frontiers in Education*. <https://www.frontiersin.org/articles/10.3389/feduc.2021.719539/full>
- Remake Learning (2015). Remake Learning Playbook: A field guide of ideas and resources for building innovation networks for teaching and learning. *The Sprout Fund*. <https://playbook.remakelarning.org/downloads/remake-learning-playbook-20151022.pdf>
- Robinson, K. (2010). RSA ANIMATE: Changing Education Paradigms. *RSA ANIMATE*. <https://www.youtube.com/watch?v=zDZFcdGpL4U&t=61s>
- Scott, I.L. (2021). A New PK-12 Education Ecosystem Framework for a New Normal. *Harvard University: Advanced Leadership Initiative Social Impact Review*. <https://www.sir.advancedleadership.harvard.edu/articles/a-new-pk-12-education-ecosystem-framework-for-a-new-normal>
- Stevenson, M. and Boxall, M. (2018). Communities of Talent: Universities in local learning and innovation ecosystems. https://www2.paconulting.com/rs/526-HZE-833/images/1_1_84229_Communities%20of%20Talent%20Report.pdf
- Supovitz, J. (2009). Can high stakes testing leverage educational improvement? Prospects from the last decade of testing and accountability reform. *Journal of Educational Change*. https://www.researchgate.net/publication/225563184_Can_high_stakes_testing_leverage_educational_improvement_Prospects_from_the_last_decade_of_testing_and_accountability_reform#:~:text=Supovitz%20%282009%29%20reports%20the%20major%20trends%20and%20influences,for%20educational%20reform%20in%20America%22%20%28p.%20211%29.....%20455%29..
- The Science of Learning and Development (2020). How the Science of Learning and Development

Can Transform Education. <https://www.soldalliance.org/what-weve-learned>

UK Department for Business, Energy & Industrial Strategy (2018). Views on the green economy: A survey of young people asking for their views on the green economy. <https://www.gov.uk/government/publications/views-on-the-green-economy-survey-of-young-people>

UNESCO (2021a). Education: From disruption to recovery. <https://en.unesco.org/covid19/educationresponse>

UNESCO (2021b). 100 million more children under the minimum reading proficiency level due to COVID-19. <https://en.unesco.org/news/100-million-more-children-under-minimum-reading-proficiency-level-due-covid-19-unesco-convenes>

UNICEF (2021). What Makes Me? Core Capacities for Living and Learning. https://www.unicef-irc.org/publications/pdf/What-Makes-Me_Core-Capacities-for-Living-and-Learning.pdf

UNICEF (2017). Reimagining Life Skills and Citizenship Education in the Middle East and North Africa: A Four-Dimensional and Systems Approach to 21st Century Skills—Conceptual and Programmatic Framework. https://www.unicef.org/mena/media/6151/file/LSCE%20Conceptual%20and%20Programmatic%20Framework_EN.pdf%20.pdf

United Nations (2020). Policy Brief: Education during COVID-19 and beyond. https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/08/sg_policy_brief_covid-19_and_education_august_2020.pdf

United Nations (2019a). Growing at a slower pace: World population is expected to reach 9.7 billion in 2050 and could peak at nearly 11 billion around 2100. <https://www.un.org/development/desa/en/news/population/world-population-prospects-2019.html>

United Nations (2019b). Green economy could create 24 million new jobs. <https://www.un.org/sustainabledevelopment/blog/2019/04/green-economy-could-create-24-million-new-jobs/>

Urban Institute (2016). Cities of LRNG. <https://www.urban.org/policy-centers/cross-center-initiatives/building-americas-workforce/projects/cities-lrng>

Varkey Foundation (2018). Global Teacher Status Index 2018. <https://www.varkeyfoundation.org/what-we-do/research/global-teacher-status-index-2018>

Varkey Foundation (2017). Generation Z: Global Citizenship Survey. <https://www.varkeyfoundation.org/what-we-do/research/generation-z-global-citizenship-survey>

Walkey, F., McClure, J., Meyer, L. and Weir, K. (2013). Low expectations equal no expectations: Aspirations, motivation, and achievement in secondary school. <https://www.sciencedirect.com/science/article/abs/pii/S0361476X13000234?via%3Dihub>

WISE and the Qatar Foundation (2021). Developing learning ecosystems in Qatar to advance equity, inclusions, and social cohesion. <https://www.wise-qatar.org/developing-local-ecosystems-qatarreport/>

World Bank (2020). Pandemic Threatens to Push 72 Million More Children into Learning Poverty—World Bank outlines a New Vision to ensure that every child learns, everywhere. <https://www.worldbank.org/en/news/press-release/2020/12/02/pandemic-threatens-to-push-72-million-more-children-into-learning-poverty-world-bank-outlines-new-vision-to-ensure-that-every-child-learns-everywhere>

World Skills (2019). Youth Voice for the Future of Work. <https://worldskills.org/what/projects/youth-voice/>

Appendices

Appendix I. Taxonomy of providers of learning

Formal education providers: K–12 (from kindergarten to 12th grade) education providers, schools, colleges, universities, school districts and government administrators.

Informal learning providers: youth-serving organisations, arts and cultural organisations, libraries, out-of-school learning programmes, summer learning programmes, community learning organisations, festivals and events, makerspaces, volunteering and community service programmes.

Skills and training providers: trade schools, apprenticeship providers, bootcamps, sector skills bodies, sector-specific training programmes, youth employment programmes.

Business, industry and workforce training: employers, business and trade associations, industry associations, continuing professional development (CPD) providers, human resources (HR) departments, public workforce system agencies.

Online providers: national and international and place-specific learning e.g., YouTube, MOOCs (massive open online course), local learning networks that signpost opportunities and content, social networks with learning content, and network-generating opportunities.

This taxonomy was developed by the Urban Institute (cited in WISE and the Qatar Foundation, 2021).

Appendix II. Definitions of learning ecosystems

OECD (2017b): A learning ecosystem is where diverse providers, resources and learners operate as an organic unit, interacting with its environment and with other ecosystems.

Díaz-Gibson et al. (2020): learning ecosystems are social infrastructures formed by diverse actors that share a purpose and engage in collaboration to design and implement innovative responses to existing social and educational challenges. They provide a new understanding of education and the relationships between actors which challenge traditional organisational boundaries while providing place-based focus on local schools, neighbourhoods, cities, or transnational networks.

Pinkard (2019): a learning ecosystem describes the shifting constellation of opportunities, locations, people and resources in a young person's life, looking at the young person as the central unit of study.

Koul and Nayar (2020): the Holistic Learning Educational Ecosystem defines roles for each stakeholder, keeping the learner at the core. Each stakeholder envisions a future for self-development that is aligned with the development of the learner.

Stevenson and Boxall (2018): learning and innovation ecosystems are integrated communities working together to solve shared problems through the talents of their people. In their different ways, these ecosystems offer new models for the engagement of universities with their local partners to create opportunities, capabilities and solutions for their shared challenges.

Innovation Unit (2019): learning ecosystems are entities already in existence providing directly to learners. They comprise open and evolving communities of diverse providers that cater to the variety of learner needs in a given context or area.

KnowledgeWorks (2014): a learning ecosystem is a network of relationships among learning agents, learners, resources and assets in a specific social, economic and geographic context.

The Aspen Institute (2014) described “connected learning” as socially embedded, interest-driven and oriented towards educational, economic or political opportunity.

WISE and the Qatar Foundation (2021): learning ecosystems comprise purposeful connections between diverse combinations of providers (schools, cultural organisations, businesses, community organisations as well as government agencies) to create new learning opportunities and pathways to success, which advance greater equity as a result.

Global Education Futures (2018b): an educational ecosystem can be defined as a dynamically evolving and interconnected network of educational spaces, with individual and institutional providers that offer a variety of learning experiences to individual and collective learners across the learning life cycle.

McCoy (2007): an educational ecosystem involves assets and interests of all stakeholders (faculty, students, industry community, and specific individuals within each of these) combined to achieve synergistic results that benefit all (cited in Global Education Futures, 2018b).

Godfrey and Brown (2019) define a school ecosystem as based on three principles: i) the need to connect all school change ultimately to its intended educational impact on children, and by corollary to society; ii) ensuring that elements of the system—especially at the individual school level—are not viewed reductively or in isolation; and iii) viewing system change as both interconnected and working in patterns of multidirectional cause and effect.

Vishal Talreja: “A learning ecosystem includes all the key stakeholders: young people, educators, school leaders, employers, government, media, investors etc who are all invested in what I would call a shared purpose; this is different from a shared vision, as this could be different but the purpose of why they’ve come together is the same. Essentially, at a simple level an ecosystem is multiple stakeholders” (cited in Global Education Futures, 2020).

Stephen Harris: "A learning ecosystem is every aspect of the community that enables learning to happen. In a narrow sense when someone is talking about how they learn, they refer to courses/projects etc but they are also just as likely to refer to YouTube which also becomes part of our learning ecosystem. An ecosystem is all the parts that create a learning environment for an individual. But then the collective learning ecosystem is a broader definition, it's a learning community, who choose to interact with each other in order to promote learning at every opportunity" (cited in Global Education Futures, 2020).

Gabriel Cámara Cervera: "An education ecosystem is basically an education that gets to the inner core of personal transformation; it's not a superficial type of education, not just to acquire skills but to go directly to what is transformative. It's aiming at an education system that provides education to people that changes them innerly, to discover themselves and their potential, their relationship to other people, nature, obligations they have, joy in sharing things. That type of education would make for a good system" (cited in Global Education Futures, 2020).

Ismael Palacín: "It's more defined for its features and geometry than a definition by itself, but maybe it could be an environment in which the actors can get the most value, learning and practises, and actors can be recognised; and the environment, in which at the same time, actors can develop their leadership and scale their vision easily, maybe is for me the difference between an ecosystem and a platform or a program or other things in education" (cited in Global Education Futures, 2020).

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