Technical Paper

Education for Human Flourishing

A Conceptual Framework

OECD
BETTER POLICIES FOR BETTER LIVES

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Foreword

The education of the past has created an amazing world around us. Our culture, our language, our way of life, the technologies we use, they are all the fruits of our education. However, this education has left the world also with some disconnects: the growing disconnect between the infinite growth imperative and the finite resources of our planet; between the financial economy and the real economy; between the wealthy and the poor; between the concept of our gross domestic product and the well-being of people; between what is technologically possible and the social needs of people; and between governance and the perceived voicelessness of many.

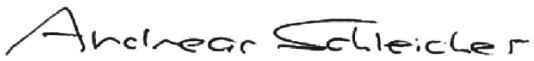
No one should hold education responsible for all of this, but neither should we underestimate the role that the knowledge, skills, attitudes and values of people play in social and economic development and in shaping the cultural context. And while digital technologies have disruptive implications for our economic and social structure, those implications are not predetermined. It is always the nature of our collective responses to these disruptions that determines their outcomes – the continuous interplay between the technological frontier and the cultural, social, institutional and economic agents that we mobilise in response.

In this environment, the Sustainable Development Goals, set by the global community for 2030, describe a course of action to end poverty, protect the planet and ensure prosperity for all. These goals are a shared vision of humanity that could provide the missing piece of the globalisation puzzle, the glue that can counter the centrifugal forces in the age of accelerations. However, the extent to which those goals will be realised will depend in no small part on what happens in today's classrooms. Our schools today will be our economy, our society and our democracy tomorrow. Education will be key to reconciling the needs and interests of individuals, communities and nations within an equitable framework based on open borders and a sustainable future, and it will be key to ensuring that the underlying principles of Sustainable Development Goals become a real social contract with citizens.

At the same time, the nature of education that will help people become successful is changing as well. Education is no longer just about teaching students something, but about helping them develop a reliable compass and the tools to navigate with confidence through an increasingly complex, volatile and uncertain world. Success in education today is about building curiosity – opening minds, it is about compassion – opening hearts, and it is about courage, mobilising our cognitive, social and emotional resources to take action. And those are also our best weapon against the biggest threats of our times - ignorance – the closed mind, hate – the closed heart, and fear – the enemy of agency.

Senior policy-makers and thought leaders from the education systems that perform best on the metrics used to measure educational success today, based on PISA, have worked with the OECD to develop a framework for the education of the future, under the umbrella of Education for human flourishing. This framework is designed to shape the metrics for measuring educational success in tomorrow's world. It encourages a broader range of capabilities, spanning the academic, the caring and the creative. It nurtures the designers of fair and sustainable models for the future. And it restores meaning to people's lives.

This publication develops the Education for human flourishing concept. It invites perspectives and comments on the concept to fuel the next phase of this work.



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This report is an output of the PISA High Performing Systems for Tomorrow project and realized by the Early Childhood and Schools Division of the OECD Education and Skills Directorate in a collaboration between participating education systems, partner organisations and experts, and with the support of Templeton World Charity Foundation (TWCF) and National Center on Education and the Economy (NCEE).

The OECD wishes to thank senior policy officials in British Colombia (Canada), Estonia, Finland, Singapore, the United Kingdom, Germany and Australia; the NCEE and International Baccalaureate; and Valerie Hannon, Kristján Kristjánsson, Charles Leadbeater, Otto Scharmer and Tyler VanderWeele for their contribution to the development of the conceptual framework. The views expressed in this report should not be taken to reflect the official position of the OECD member countries, TWCF, NCEE or any of their affiliates.

This report is an output of the PISA High Performing Systems for Tomorrow project. The authors thank Andreas Schleicher and Yuri Belfali for their overall guidance, Lucia Chauvet and Young Chang for their analytical contributions and project management support, Sophie Limoges, Dongwook Choi and Noelle Geller for the production of the report.

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Executive Summary

For several decades, education policy makers have focused on preparing young people for the labour market: the human capital theory of education. They have pursued an orientation toward science, mathematics and problem-solving within a broad curriculum, a commitment to helping all students perform well irrespective of background and the expansion of higher education.

Progress has been mixed. As flatlining results in PISA starkly demonstrate, the supply of educated people has continued to lag advancing technologies. And most countries have struggled to close the equity gap.

The human capital theory is itself now subject to critique. Modern education systems are increasingly seen as sorting young people for jobs in yesterday's economy, contributing to a crisis of mental health and inadequate to the future.

In recasting education purposes, the PISA high performing systems are looking to link education to the ancient ideal of human flourishing, while rebalancing it in the service of a broader idea: to nurture, in all of us, a suite of distinctive human capacities, that equip us not only to flourish as individuals but contribute to flourishing societies and economies, in harmony with the planet. In future, they suggest, education systems should:

- Provide opportunity and fulfilment for everyone, respecting and nurturing a broader range of strengths, including dispositions for caring and creativity.
- Equip people to design and establish the next set of economic, societal and organisational models.
- Offer new ways of seeing, sensing and interpreting the world, in ways that reconcile competing beliefs and values, re-build meaning and purpose and restore wellbeing.

Education for human flourishing draws on Aristotle, who described a flourishing life in terms of happiness, meaning, relationships and accomplishment. Education for human flourishing prepares young people to achieve all four, objectively, over a lifetime. It embraces two other significant ideas. First, it emphasises student well-being - the subjective happiness of individuals currently in education. Second, following Ubuntu, Confucianism and Buddhism, it emphasises caring for others. The crisis of the planet extends this obligation, insisting on our responsibilities to other living species and asking us to consider lives as yet unlived.

The development of education for human flourishing coincides with rapid advances in artificial intelligence. In the near term, AI threatens to undermine human meaning, human agency and human security. In the longer term (which may not be very long at all), superintelligent AI could threaten the survival of humanity itself. Education for human flourishing, in broadening and rebalancing human capabilities, restoring meaning to human lives and creating fair and sustainable models for the future, may be our best shot at controlling it.

The foundational arguments relating to Education for human flourishing point toward five competencies, designed together to promote human meaning, agency and security. The central competency is Acting in the world: the ability to find one's purpose, identify one's intent and choose and achieve appropriate

actions. In order to act in the world, one draws on two other competencies: adaptive problem solving and ethical competence. Acting in the world is itself one of three distinct competencies that enable people to find meaning in their lives. The others are Understanding the world, in a way that reconciles competing worldviews, and Appreciating the world (beauty, nature and the sublime).

The competencies do not stand alone. They are conceived within a broader architecture, resting on an education foundation and supporting the goals of human flourishing. The foundation consists of three integrated building blocks: the core literacies of Mathematics, Science and Reading; the social and emotional skills in areas including task performance, emotional regulation, engaging with others, open-mindedness and collaboration; and a set of linked student well-being domains such as psychological well-being, agency and belonging.

Education for human flourishing is no soft option. Adaptive problem-solving, Ethical competence, Understanding the world, Appreciating the world and Acting in the world are rigorous and demanding competencies. They do not replace foundational literacies but build on them. Together they open up a life of purpose, meaning and fulfilment.

If Education for human flourishing is the goal, what kind of learning environment would best support it? What does it mean for the professional development of leaders and teachers? And what does it mean for education systems?

Christine Goh and Michael Tan (National Institute of Education, Singapore) argue that learning environments should respect disciplinary knowledge, leave room for students to determine the direction of their learning and encourage them to question technology's role in society. Finally, teacher guidance and experiential learning are presented as the twin building blocks of active learning, the signature Education for human flourishing pedagogy.

Valerie Hannon offers a systemic approach to professional development, helping reframe education's purpose in light of the challenges humanity faces. She suggests that leaders should be competent in re-booting educational purpose, orchestrating ecosystems, championing equity, systems thinking, leading and managing innovation and developing agency. Teachers should be competent in facilitating deep learning, curriculum co-design, assessment choreography and digital literacy.

The Education for human flourishing framework concludes with implications for system design. Three themes come into relief. The first is purpose, the key to "system shift". The second is ecosystems, which both guide the integration of formal and non-formal learning and deepen the quality of awareness and relationships. The third is the potential for system transformation when leaders' purpose and awareness work in tandem. The argument about systems echoes the argument about students. There too, individual purpose, developed through intent and agency, is an organising idea, anchoring the central competency in the Education for human flourishing framework: Acting in the world.

Education for human flourishing builds on the OECD Education 2030 Learning Compass in three ways First, it proposes a set of principles for addressing the weaknesses of the current education paradigm. Second it foregrounds the challenge and opportunity of AI and related technologies. Third, it develops some key concepts: in particular, flourishing is distinguished from well-being; and adaptive problem solving, ethical decision-making, and understanding, appreciating and acting in the world are presented as specific competencies that enable people to flourish and discover their purpose.

1 Education for human flourishing: Foundational arguments

Education purposes

The origins of education lie in the ancient world. In many of the major cultures, education equipped a small minority of people with knowledge and understanding, capacities to contribute to the civic sphere and the interests and accomplishments that make life fulfilling.

Modern education systems, since their emergence in the 18th Century, have continued to value the fulfilment of the individual. At the same time, by nurturing shared understandings of citizenship, interdependence and mutual interest, they have sought to build cohesive societies: democratic values and processes and inclusive social and economic institutions are the legacy of education's "nation-building" function.

As the industrial era developed, equipping people for the labour market became a central responsibility for education systems. In their classic analysis of education and the economy in the United States since 1900, Goldin and Katz examine the capacity of the American system to ensure that the supply of educated people outstrips the demand for educated people caused by technological advances. They note that a corollary goal of education, reflecting its egalitarian 19th Century origins, has been to spread opportunity and narrow economic inequality across the population. They show that when education outstripped technology, between 1900 and 1975, economic inequality decreased, but when technology outstripped education, between 1975 and 2000, economic inequality increased. They point to a similar trajectory in other major economies (Goldin and Katz, 2010[1]).

This is the Human Capital Theory on the aims of education, pursued by policymakers around the world since the 1970s. They have used a broadly shared approach: an orientation toward science, mathematics and problem-solving within a broad curriculum, a commitment to helping all students perform well irrespective of background (equity), and the expansion of higher education.

Progress has been mixed. The supply of educated people has continued to lag behind advancing technologies, as flatlining results in PISA starkly demonstrate. Most countries have struggled to close the equity gap. More broadly, the Human Capital theory has itself been progressively undermined. The HPST group has reflected on three particular critiques.

The first is that the drive for economic growth, on which the Human Capital theory is premised, has been secured at too high a price. In many countries, we see widening wealth gaps, disruptive migrations and increasing social fragmentation. Despite international efforts to check fossil fuel emissions, current trends in global warming suggest that parts of the world will soon become uninhabitable or at least hostile to life. Consumption far exceeds the capacity of the earth's remaining natural resources to sustain it. And the continuing destruction of living species has caused a collapse in biodiversity. The economic model for which education systems have been providing human capital has caused damage to societies and the planet itself.

The second critique concerns the role of education in differentiating between people. The supply of human capital has been regulated by academic examination and progression. Schools have long served as a gateway to tertiary education for many countries by sifting students through testing. Recently, in many countries, college degrees have in turn become a signalling system, enabling employers to sort and remunerate applicants according to the prestige of the institution from which they graduate. In this way, Sandel argues, education determines winners and losers in a starkly divisive meritocracy. Those who succeed may have applied themselves and to that extent merited their success. But they are fortunate to be born with the skills that society values. He notes that in the United States and other countries, in protest against excessive inequalities, the decline of their communities and a personal loss of social esteem, those who don't succeed in education form the electoral base of populist politicians (2020[2]). Wooldridge defends meritocracy. It is right, he argues, that people get ahead not through nepotism or patronage but their natural talents, with a system that provides education for all, forbids discrimination and awards jobs through open competition. But he concedes that the recent implementation of meritocracy has been flawed, not only because educated elites have proved effective in engineering opportunities for their children but because the main measure of merit itself, ability in cognitive skills, is excessively narrow (2021[3]).

The third critique is that education is failing to address a new and urgent problem. In surveys, many people say their lives lack meaning. Less confident in their prospects for employment and prosperity, but also less likely to share beliefs and values and less secure in allegiance to place, community, gender and faith, they lack a sense of what their lives are for – the foundation of well-being and mental health. Some people see the current mental health epidemic among young people not so much as a psychological phenomenon as signalling an ethical and existential gap in a generation that is struggling to formulate its moral identity and find purpose in the provisions of today's schools.

It has become clear in the 21st Century that developing the cognitive skills of young people for a job in the knowledge economy is not sufficient as the purpose of education. Work should support fair and sustainable societies and confer meaning on the individual. Education should nurture capabilities both for work and life, including capabilities for caring and creativity.

Conceived in this way, education is not only a moral obligation but a practical necessity. It will fall to the next generation to renew the productive economy and remake the societal, political and organisational infrastructure of the modern world. Young people will need a complete portfolio of skills, dispositions and values.

In its 2024 Global Risks Report, the World Economic Forum analyses the cost of inaction over the next ten years: unchecked conflict, a deteriorating climate, widespread poverty and a tide of misinformation drowning societies already politically and economically weakened. The Future of Humanity Institute at Oxford, looking further ahead, lays out a series of global catastrophic risks, spanning natural risks such as a super volcano, technological risks including synthetic pandemics, anthropogenic climate change and nuclear terrorism and political risks in the form of totalitarianism (Bostrom and Ćirković, 2008[4]).

But where some see existential risk, others see existential hope. The Foresight Institute is "collecting positive and possible scenarios, so that we can have more people commit to the creation of a brighter future and start mapping out the main domains and challenges to be navigated to reach it".

In this spirit, Pavel Luksha has proposed four domains, each with urgent challenges for the young to solve: the regenerative economy (energy transition), participative governance (citizen-generated data), culture (learning ecosystems for social transformation) and consciousness. In the sphere of consciousness, he sees the opportunity to develop collective wisdom, drawing on shared human capacity, AI-assisted reasoning and new approaches to integrating insight, empathy and judgement. He also foresees a new paradigm of human knowledge that combines quantum mechanics, complexity science and evolutionary theory (2023[5]). Luksha echoes Raworth, arguing that the space for future work and activity lies between

a social foundation beneath which no-one should fall and an ecological ceiling above which the Earth will be further degraded (2017[6]).

Meeting challenges on this scale, by putting to work their cognitive, creative and caring capabilities, could in turn address the meaning deficit so many people feel.

For the first time in many years, the bearings of education are being widely discussed. The HPST group suggests three principles around which future systems should be built.

- Education should provide opportunity and fulfilment for everyone, respecting and nurturing a broader range of strengths, including dispositions for caring and creativity.
- Education should equip people to design and establish the next set of economic, societal and organisational models.
- Education should offer new ways of seeing, sensing and interpreting the world, in ways that reconcile competing beliefs and values, re-build meaning and purpose and restore well-being.

Educators often say that with the pace of change so rapid, and the understanding of what lies ahead so limited, the best they can do is help students develop a reliable compass and the tools to navigate uncertainty. But in the face of such profound challenges, are a compass and tools enough? In recasting education purposes, the HPST group is looking to link education to the ancient ideal of human flourishing, rebalancing it in the service of a broader idea: to nurture, in all of us, a suite of distinctive human capacities, that equip us not only to flourish as individuals but contribute to flourishing societies and economies, in harmony with the planet.

Education for human flourishing

How should flourishing be conceptualised? What would education that enables people to flourish look like? And would it meet the principles we have set for it?

An Aristotelian perspective

The High Performing Systems for Tomorrow project has adopted a neo- Aristotelian perspective on human flourishing, drawing on the work of Kristján Kristjánsson (2019[7]). Kristjánsson has recently contributed further thinking to the project, locating Aristotle in a range of western and non-western traditions (2023[8]).

Reflecting an analysis by De Ruyter et al (2022[9]), Kristjánsson shows that in the European tradition flourishing is assessed mainly according to objective criteria relating to facts about a person's life; is intrinsically worthwhile; optimises human potential over life as a whole through ongoing activities that pursue objective goods; and is possible only when a set of preconditions, such as family, health, safety and material comfort, are in place. The major flourishing accounts are Aristotelianism, liberalism, positive psychology, and self-determinism theory.

- Aristotle, the Greek philosopher, saw flourishing as the intrinsically desirable, ultimate end of human beings. Flourishing is what human beings do when they achieve their full potential. It involves virtuous activity (moral, civic, intellectual and performative), suitable and peculiar to human beings, achieved over a whole life.
- The positive psychology account developed by Seligman foregrounds five dimensions of the flourishing life: positive emotion, engagement, meaning, relationships and accomplishments (PERMA). Seligman argues that all five dimensions are underpinned by character and virtue (2012[10]).

- The liberal account, originating in the political philosophy of Locke, presents the flourishing life as one in which the individual develops their autonomously chosen capabilities, emphasising the role of the state in creating the enabling background conditions.
- Self-determination highlights three needs that humans must satisfy in order to flourish: autonomy, relatedness and believing oneself to be competent.

For the High Performing Systems for Tomorrow project, there are two justifications for building on Aristotle. First, Aristotle places special emphasis on what people should learn in order to flourish, in a way that opens up all the central issues for education, including not only curriculum but pedagogy and assessment; whereas the liberal and self-determination accounts are less directive of what people should learn. Second, Aristotle's thinking in the mid-4th Century BCE corresponds in interesting ways to Seligman, the contemporary psychologist. The correspondence lies not only in their reliance on character but in the dimensions of flourishing in which they are interested.

Table 1.1. Ancient and modern: the dimensions of human flourishing

Aristotle (Nicomachean Ethics)	Seligman (Flourishing, 2015)
Pleasure	Positive emotion
Activity	Engagement
Friendship	Relationships
Contemplation/use of the mind	Meaning/Purpose
Prosperity and success	Accomplishments

Source: Chart adapted from Humanity 2.0, Project Vision White Paper (Sullivan, 2019[11])

Kristjánsson's neo-Aristotelian account of Education for human flourishing consists of three components: moral, reason-infused, emotionally driven, activities that are meaningful to the individual and have some consequence in the world; contemplation; and awe-struck enchantment (2019[7]). The first and second components come from Aristotle. The third borrows on 19th Century Romanticism, as well as Humanistic and Positive Psychology. What Aristotle meant by contemplation is the intellectual capacity to derive principles from observation of the physical world (wondering about the world). This leaves space for awe (wondering at the world, from sublime sunsets to crystals seen through a microscope).

What kind of education proposition is this? It is a description of activities people should learn to undertake in order to be and to act in distinctively human ways. At its centre stands a double objective: the development of human cognition, exercised according to moral principles and informed by scientific reasoning; and the development of human meaning, both through one's personal contribution in the world and one's sense of something bigger and more mysterious.

But if this proposition is to be compelling in the 21st Century, it should address two other profound concerns: well-being and what we owe to others.

Well-being

Aristotle was primarily interested in the objective features of flourishing. Modern writers such as Seligman focus on its subjective features too. The growing realisation that large numbers of students are very unhappy, and even suffer from significant mental health problems, places student well-being at the heart of research and policymaking in education.

Student well-being in PISA has been defined as a dynamic state characterised by psychological, social, physical, cognitive and material factors that enable students to live well (Borgonovi and Pál, 2016[12]). Building on this definition, the Harvard Human Flourishing Program has contributed to High Performing

Systems for Tomorrow a study of how education practices, in areas including relationships, character skills, health and meaning, contribute to student well-being (Hinton, Hill and Yemiscigil, 2023[13]).

There is one notable difference between the neo-Aristotelian account of education that supports human flourishing and some accounts of education that support student well-being. What is central to neo-Aristotelianism is education that enables objective flourishing over a lifetime. What is central to student well-being accounts is the subjective happiness of individuals currently in education. The first relates more to positive education outcomes. The second relates more to positive education experiences.

Nevertheless, reconciling education for human flourishing and education for student well-being is vital to developing new and expanded aims of education. There is every reason to place an Education for human flourishing programme in a carefully designed learning environment, where the learning principles, pedagogies and practices support both objective flourishing and subjective well-being.

What we owe to others

The emphasis on individual flourishing should not suggest that the flourishing of others does not matter. Looking at three non-European approaches to flourishing, Kristjánsson (2023) underlines the central importance of caring for and about others.

- In Ubuntu, he notes, selfhood is realised through others. It is only by caring for others' needs that one cares for one's own. Education is the process of "learning to participate in socio-moral projects that have communal value".
- Confucians pursue harmonious relationships through a process of continuous transformation. The goal of education, emphasising empathy and compassion, is to integrate the capabilities of both the individual and the group in service of the community.
- Buddhists reject the concept of individual selfhood. The goal of education is to overcome anger, egoistic craving and intellectual illusions; and become compassionate toward all living beings and the natural environment.

Kristjánsson concludes that all three approaches are inherently relational and other-entwined and compatible with the neo-Aristotelian approach. Education for human flourishing concerns one's own flourishing and the flourishing of others.

The crisis of the planet extends these obligations. First, it insists on our responsibilities to other living species. Second, it prompts us to consider the interests of future lives. MacAskill argues that the number of past and present lives will be far exceeded by the number of future lives that could be lived before the natural extinction of the earth. History shows us that we can shape future lives, for good or ill. Education should develop the values and capabilities in today's generation to ensure that the interests of future generations are given full weight (2022[14]).

Education for human flourishing and artificial intelligence

The growing interest in human flourishing coincides with rapid developments in artificial intelligence. Will AI inhibit or facilitate human flourishing?

Artificial intelligence is the defining technology among a family of technologies, spanning robotics, the Internet of Things, nanotechnology, biotechnology, materials science, energy storage and quantum computing.

> *An AI system is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments. It uses real or machine-*

> *based inputs to perceive real or virtual environments; abstract such perceptions into models; and uses model inference to formulate options for information or action… AI take up is accelerating rapidly in sectors where it is possible to detect patterns in large volumes of data; and model complex, interdependent systems to improve decision making and save costs. (OECD, 2019[15])*

It is machine learning that has galvanised AI. One definition of intelligence is the capacity to achieve one's objectives. Thanks to machine learning, robots can now achieve the objectives set for them by humans, in defined fields of activity (Russell, 2021[16]).

As a contribution to High Performing Systems for Tomorrow, the Australian Department of Education has synthesised cross-government perspectives on the evolution of AI, presenting a careful assessment of its significance for individuals, societies and economies. A striking feature of this work is how AI offers both opportunities and threats, differently balanced in each sphere.

- In the individual sphere, AI systems could relieve us of humdrum tasks that demand our time and attention, from shopping to diary management. But at the same time, the automation of our personal lives could further undermine self-worth, identity and meaning.
- At the societal level, deep analysis of large data could accelerate increased social mobility and reduced inequality. But we already see how AI is fuelling the misuse of power in improper sale of data; the growth of hidden surveillance; interference in democratic processes; fraud, theft and extortion; and the creation and distribution of false and misleading information.
- The economic calculus is finely balanced. AI offers opportunities to enhance productivity and innovation. But workers in many sectors and at all levels may see the rapid automation of their skills, leading at best to a period of painful disruption.

How do these threats and opportunities relate to the three principles for future education?

AI and broadening human capabilities.

It is often said that the effect of increasing AI capabilities will be to compel human beings to extend our own capabilities, into areas that AI will not reach. The AI Research Roadmap, guiding researchers and policymakers in the United States, suggests that by 2040 AI will be effective in critical thinking, creative thinking, ethical reasoning, flexibility and collaboration. The OECD's Artificial Intelligence and Skills project predicts that AI will in due course be capable of everything humans do, barring only tasks involving visual input, complex motor movement and the resolution of unstructured problems. Influenced by analyses of this kind, we can be tempted to see AI as undermining human agency. As it mimics our capabilities and confiscates our tasks, what are we left to do?

But it doesn't have to be a long withdrawal, humans ceding ground to robots. At our best, we do more than segment our work into discrete, automatable tasks. Instead, we look across activity as a whole, deploying an integrated suite of cognitive, metacognitive and socio-cognitive skills in design, evaluation, communication and execution. What AI does imply is that socio-cognitive and meta-cognitive skills should be given more weight in teaching and learning. Above all, AI prompts us to explore the possibilities of our human creativity. How can we harness all that we do and are? How can we integrate the full suite of human capabilities, holistically and intuitively, to imagine and design our futures?

AI and developing new models for the future.

AI is seen as undermining on not only human agency but human security. Certainly, its use in economic crime, surveillance capitalism, misinformation and political interference all make our existing societal, economic and organisational models less fair and less sustainable. At the same time, AI may facilitate new approaches and models for media freedom, democratic processes and the rule of law. Policy makers,

scientists, researchers and designers may find AI invaluable in creating more sustainable and non-discriminatory solutions.

AI and restoring meaning to individual lives.

Will AI encroach on what it is to be a person? Will it further damage our sense of purpose, and identity, to the point of undermining human meaning?

In the political sphere, algorithms are already used to target specific categories of voter with specific messages. Harari suggests that future citizens may delegate their political rights to an artificially intelligent agent which remembers their prior choices and the circumstances in which they were made, interprets them in the light of patterns in everyone's choices and circumstances - and casts a vote accordingly. In the consumer sphere, he envisions an agent that remembers every product preference ever expressed - and makes the next purchase for us (2015[17]).

At the very least, therefore, the growing influence of AI, in these and other areas, suggests that humans should both seek to limit its impact on activities that provide us with meaning and develop new sources of meaning by nurturing broader capabilities and finding deeper purposes.

The next horizon?

Narrow Artificial Intelligence, the capacity of machines to solve the problems humans set them in defined fields of activity, is widely seen as the gateway to General Purpose Artificial Intelligence: the capacity to learn, generalise and apply knowledge across multiple fields of activity. GPAI is another country.

Some senior AI researchers see its "sparks" in the large language models such as ChatGPT that are trained through machine learning processes to offer an argued response to any question.

Harari concedes that from now on the artifacts of culture (literature, media, art, laws and history itself) will no longer be the exclusive product of the human mind. But before heralding GPAI, he wants evidence of consciousness and the ability to interact with the physical world.

Bostrom argues that GPAI sits alongside whole brain emulation, brain/computer interfaces and cognitive enhancement as a possible - and the most likely - route to superintelligence. He presents superintelligence as both a defence against existential risk, natural and man-made, and a creator of existential risk, in the form of a totalitarian future.

> *A single AI agent designs better and better versions of itself, quickly developing abilities far greater than the abilities of all humanity combined. Almost certainly, its aims would not be the same as humanity's aims. And in order to better achieve its aims, it would try to gain resources and try to prevent threats to its survival. It would therefore be incentivised to take over the world and eliminate human beings or permanently suppress them. (Bostrom, 2014[18])*

Bostrom sees the essential task of our age as steering the development of AI, by slowing it to advance other technologies first and focusing it on problems that contribute positively across multiple scenarios and are acceptable from a range of viewpoints. He sees this as "a morally exploratory world".

The likelihood of GPAI and superintelligence, whether achieved in a few decades or longer, poses challenges to humanity of a different order. Education for human flourishing, in broadening and rebalancing human capabilities, restoring meaning to human lives and creating fair and sustainable models for the future, may be our best shot at controlling it – and so securing, in Bostrom's words, "the attainment of a civilisational trajectory that leads to the compassionate and jubilant use of humanity's cosmic endowment".

Education for human flourishing competencies

Education for human flourishing aims to encourage a broader range of capabilities, spanning the academic, the caring and the creative; nurture the designers of fair and sustainable societies, economies and organisations; and restore meaning to individual lives. Central to the framework are a set of competencies, designed to equip human beings to flourish in an AI world.

Adaptive problem solving

Adaptive problem solvers vary their behaviours and understanding to address new and complex challenges, problems and situations. They do this by applying what they have learned in one context to another, drawing on higher-order thinking and decision-making skills. Proficiency in adaptive problem-solving means being able to make good choices in a variety of real-life situations where outcomes are uncertain and where routine solutions are unlikely to work. Adaptive problem solving is a central component of Education for human flourishing, equipping the next generation to design, build and lead societies, economies and organisations for the future.

Ethical reasoning

Ethics equips us to evaluate and respond to the claims that others make on us. An ethical perspective combats prejudice against people who are different to ourselves and balances our needs with the rights of other species and the planet. Ethical reasoning enables altruistic choices and instils our lives with purpose. Ethics combines intellectual humility; the ability to balance diverse viewpoints, perspectives, and contexts; and an orientation toward the common good and shared humanity. It shapes our values and guides our decision-making. It is Education for human flourishing's foundation stone.

Understanding the world

Understanding the world is the first of three linked competencies that address the loss of meaning reported around the world. Its premise is that a deeper understanding of the cultural forces that are shaping and dividing us could help re-establish our moorings and restore our bearings. Lene Rachel Andersen distinguishes between four competing and unreconciled belief systems. The indigenous view emphasises tribe, myth, order and the integration of human beings into the natural world. The pre-modern view subordinates the individual to religious and community norms. The modern view balances the needs of individuals and society: within a framework built on science, democracy and nation states, it provides the institutions that continue to shape our world. And the post-modern view exposes the arbitrariness and hidden structures of those institutions - but offers no replacements. In a hyper-connected global society, she concludes, the answer cannot be to ignore or confront other belief systems but to synthesise them. The task is daunting. It is to find an epistemology for the 21st Century, around which people of all beliefs can rally (Andersen Rachel, 2019[19]).

Appreciating the world

Competency in appreciating the world (aesthetic perception) builds meaning in a different way. Gardner defines aesthetic perception in terms of appreciating the beauty of experiences. To count as beautiful, "an experience must be interesting enough to behold, have a form that is memorable and invite revisiting". Looking at a picture, listening to a story, taking a shower or enjoying the walk home could all be examples.

Aesthetic perception involves interrogating one's responses to an experience and attending to its meaning for one's ideals, emotions, and actions. How does this particular experience challenge how I frame the world? Am I prepared to change how I frame the world?

Aesthetic perception is a significant dimension of Education for human flourishing. Through aesthetic perception we appreciate the sublime: what is mysterious, awe-inspiring and transcendent. It unlocks insight into life and self. It elicits compassion toward others and sheds light on different worldviews. And to this extent it complements the competencies of ethical reasoning and interpreting the world.

Acting in the world

Acting in the world is about making one's mark. Understanding and appreciating the world entails extracting meaning from the external environment. Acting in the world involves stamping one's own meaning on the external environment.

It is a concept that includes but goes beyond the contribution one makes through paid work. At its heart is the invitation to develop purpose and intent, through chosen activities. For young people, these activities may lie in art, design and making; music, dance and acting; sport; or volunteering and service. They may be individual or participative in nature. They draw on creativity, broadly conceived, and thrive on the spirit of play.

When we make our mark in these ways, we develop a further dimension of flourishing. In Aristotle's terms, we do something significant in the eyes of others; deepen and enrich our experience of living; and add to our accomplishment, in the double sense of achievement and becoming a rounded human being.

The five competencies do not stand alone. They are conceived within a broader architecture, resting on an education foundation and supporting the goals of human flourishing.

The foundation consists of three integrated building blocks: the core literacies of Mathematics, Science and Reading; the social and emotional skills in areas including task performance, emotional regulation, engaging with others, open-mindedness and collaboration; and a set of linked student well-being domains such as psychological well-being, agency and belonging.

Young people who have assembled a strong education foundation and developed the five competencies are seen as equipped to pursue the goals of happiness, relationships, meaning and accomplishment.

The competencies are neither substitutive, in the sense that students learn them instead of other things, nor additional, in the sense of making significant new demands on time and teaching in an already-crowded curriculum. Rather, they are emergent properties of the curriculum as a whole. All the competencies are believed to be malleable and assessable. The HPST group is looking to identify pedagogies that can foster them and approaches to measuring and assessing them.

Conclusion

For many students, parents, teachers and even businesses, it is no longer sufficient to ground the purposes of education in employment. The disruptions besetting the global economy, the divisive nature of the education process and a related decline in well-being all point to the urgent need for education renewal. Education for human flourishing addresses just that. It looks to equip young people to build new models for the future, develop a wider range of capabilities and rediscover meaning in their lives.

Education for human flourishing nurtures flourishing at every level: individuals, communities, societies and the planet itself. As developing experts in adaptive problem-solving and ethical reasoning, young people can find fair, practical and sustainable solutions to tomorrow's problems. By reconciling worldviews, drawing inspiration from beauty and unlocking their talents and passions, they develop discernment and equilibrium for challenging times.

Charles Leadbeater argues that students should go to school to become "purposeful, reflective and responsible" people, who can see what needs to be done and set about doing it (2022[20]).

This, then, is potentially the offer to the next generation: that education will prepare them to bring about change. Through education, as they develop into adaptive, ethical problem-solvers, able to understand, appreciate and act in the world, they will discover their purpose and be capable of realising it.

The foundational arguments underpinning Education for human flourishing were shaped over a two-year period. At the same time, the high performing jurisdictions have been considering specific policies and practices that potentially flow from these arguments. These are set out in the next section, under four headings:

- **Competencies.** A detailed analysis of the five Education for human flourishing competencies and an overview of the Education for human flourishing architecture, explaining the relationship of the five competencies to the major literacies, social and emotional skills, the well-being domains and the key dimensions of human flourishing itself.
- **Learning environments.** Proposals for learning spaces, themes and pedagogies to support Education for human flourishing.
- **Teacher and learners.** A new competency framework for teachers and school leaders.
- **Education systems.** Perspectives on what Education for human flourishing means for the next generation of national education systems.

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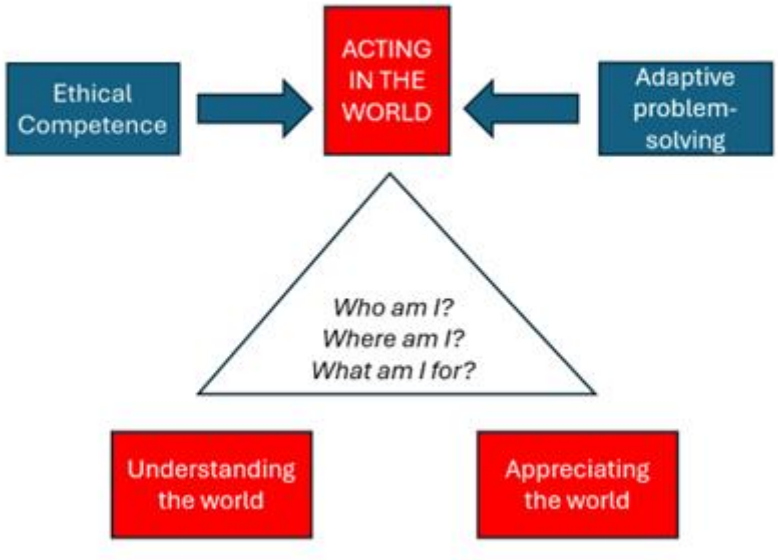
2 Education for human flourishing: Competencies

As we have seen, the foundational arguments relating to Education for human flourishing point toward a set of competencies. Without these competencies, people are unlikely to flourish in the full sense of that word. With these competencies, they have every opportunity to flourish, though flourishing cannot be guaranteed.

The competencies flow from three system principles; that young people should develop cognitive, creative and caring capabilities; contribute to the renewal of societies, economies and organisations; and rediscover meaning. These principles emphasise the concepts of human agency, security and purpose. AI, which appears to undermine these concepts, in fact prompts us to reconceptualise them in ways that enhance flourishing.

The High Performing Systems for Tomorrow initiative proposes five Education for human flourishing competencies, as follows:

Figure 2.1. The Education for human flourishing competencies



The central competency is Acting in the world: the ability to find one's purpose, identify one's intent and undertake activities. In order to act in the world, one draws on two other competencies: adaptive problem solving and ethical competence. Acting in the world is itself one of three distinct competencies that enable

people to find meaning in their lives. The others are Understanding the world, in a way that reconciles competing worldviews, and Appreciating the world (beauty, nature and the sublime).

Taken together, Ethical competence, Adaptive problem solving, Understanding the world and Appreciating the world evoke the classical virtues of truth, beauty and goodness. In *Truth, Beauty and, Goodness Reframed* (2011[1]), Gardner makes the case for their continuing relevance.

> *Each of the virtues is best exemplified by certain specific human activities: science and journalism traffic in truth; art and nature in the sphere of beauty; goodness concerns the quality of relations between human beings. The trio of virtues, while unquestionably in flux and under attack, remain essential to the human experience and indeed to human survival.*

For our definition of competency, we draw on the foundational work undertaken by PISA.

> Competencies contribute to valued outcomes for societies and individuals; help individuals meet important demands in a variety of contexts; and are not just for specialists but for all individuals. They combine knowledge, skills, values, and attitudes. *(OECD, 2005[2])*.

Assessment is also a fundamental component of education systems. The way students are tested significantly shapes the future of education by signalling what is prioritized in curriculum and instruction. Tests inherently influence what is considered important: teachers, school administrators, and students alike focus on what is assessed and adjust accordingly. A key question for the future of education is thus: how can we design assessments that effectively track education's core mission – to empower learners who can pursue their goals and make effective, responsible, compassionate decisions in various life contexts?

Relevant assessments allow students time to understand complex problems and devise their own solutions, choosing strategies and resources that suit them. New technologies, including AI-powered tools, make it easier to create these active, immersive, and iterative performance-based tasks, which better measure students' readiness for future learning and flourishing. Technology also offers the promise of continuous evaluation systems where evidence of student progress is gathered seamlessly over time. This does not mean administering more frequent tests but rather unobtrusively collecting data as students work with teachers and peers on digital platforms. As technology converts data into accessible insights, teachers can better understand their students and focus on supporting specific learning needs in a more continuous manner. Meanwhile, students can use these insights to self-evaluate and seek the right guidance to improve their learning journey. However, realising this vision requires a paradigm shift in how assessments are understood and applied by all stakeholders in the education system.

To ensure broad adoption and coherence across all levels of assessment, it will be important to develop both summative assessments for national and international comparisons and formative tools that empower teachers and students to track progress on these competencies. The goal is to create a unified system where high-quality assessments drive high-quality learning.

The rest of this chapter analyses the Education for human competencies in turn. Adaptive problem-solving is the most complete, providing a template for the development of the other four. Ethical competence comes next. Building on the national curriculum in Estonia, it offers detailed perspectives on perception, reasoning and action. The competencies associated with meaning making begin with Appreciating the World, the most developed. Understanding the World and Acting in the World, which are less developed, follow it. The chapter ends with an Education for human flourishing architecture. This shows how the five competencies not only support the dimensions of human flourishing but are grounded in maths, science and reading, social and emotional skills and a set of well-being factors.

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2.1. Adaptive problem-solving

Business leaders, organisations and researchers have increasingly called for education policies targeting the development of transversal skills and preparing students for participation in a global knowledge society, where many tasks can now be performed by machines.

Several international frameworks have identified the so-called 21st century competencies that young people require to succeed in their lives (Binkley et al., 2011[1]; Pellegrino and Hilton, 2012[2]; Scott, 2015[3]). The framework of education for human flourishing claims that "adaptive problem-solving", "ethical decision-making", and "understanding, appreciating and acting in the world" are core competencies that enable people to flourish, by discovering and pursuing their purpose in life. In this framework, the ability to solve novel problems as an adaptive expert is essential for becoming an engaged citizen who can "act in the world". At the same time, active learning experiences that enable students to act and take decisions help them in turn to develop adaptive problem solving - these two competences are thus closely interconnected. Adaptive problem-solving involves two key components: designing solutions in situations where the problem space is not fully known and regulating one's own learning process.

Adaptive problem solving will remain crucial even as AI systems continue to evolve. Today, AI systems tend to be "idiots savants," reaching or exceeding the performance of human experts in a very narrow range (Akata et al., 2020[4]). However, this might change over the next years, as AI systems become more capable of solving complex problems and get trained to become "curious" and "creative" (Haber, 2022[5]), learning less from carefully curated datasets and more from experience in ways that resemble human learning. In this evolving context, humans will need to be even more inventive and adaptable - both in designing AI systems that complement human intelligence and in integrating AI into workflows and societal functions effectively. Additionally, individuals must continuously re-assess what is important to learn and develop the ability to collaborate with an AI and use feedback from AI systems. Educating young people to become adaptive problem-solvers is essential to realising the potential of hybrid intelligence (HI) - the integration of human and machine intelligence. In this vision of the future, AI enhances human intellect and capabilities rather than replacing them, enabling AI-human collaboration to achieve goals that neither could accomplish alone.

Yet for as much as 21st century or flourishing competencies are now a familiar component of contemporary discourse on education, we also need assessments that measure these competencies if we want to shift policy into practice. In fact, what we choose to assess ends up being the focus of instruction.

It is critical that the design of these new assessments reflects the forms of learning we want to emphasise in our classrooms. Doing so requires that we move away from measuring what is easy to measuring what matters (Piacentini and Foster, 2023[6]). If a fundamental goal of education is to train students to become adaptive problem solvers who can navigate uncertainty and learn on their own – then we must invent new assessments that can validly measure how well education systems are preparing students to do so. We must shift from a narrow focus on knowledge reproduction to a next generation of assessments that evaluate students' ability to learn and solve complex problems in interactive environments where they can use resources and exchange information with others (both humans and AIs).

This paper presents design ideas for an innovative assessment of adaptive problem-solving. Proficiency in adaptive problem-solving means being able to make good learning choices in a variety of real-life situations where outcomes are uncertain and where routine solutions are unlikely to work. At the end of their school life, students will not have sufficient knowledge schemas or procedures to address many of the situations they will encounter in real life. As societies rapidly transform due to global challenges like climate change and the rise of AI, they will face problems that were unimaginable during their childhood. However, if their schools have prepared them well for learning autonomously, then students will be able to navigate most of these situations by exploring the problem space, planning and implementing actions, monitoring the consequences of their choices and adapting to feedback. Using technology in a principled way, we can design simulations that respond to the choices students make, and collect the evidence to validly assess their decision-making competences.

The paper proposes ideas for the different components of an evidence-centred assessment design (the student, task and evidence models), and includes examples of technology-enhanced tasks to illustrate how these ideas can be implemented in either large-scale or formative assessments.

The importance of an evidence-centred design

Developing a new assessment is a complex task that requires a series of strategic decisions, starting from broad objectives and narrowing down to specific tasks and measures. Assessment designers must consider multiple interconnected questions: what claims do we want to make about students, and how will these claims be used? In what situations will students apply the skills we assess? What defines good performance, and what constitutes evidence of different skill levels? Should we focus on the mental processes and decisions the students take, or on the final product of their work, or on both? How can we convert observations into scores, and how should these scores be reported for meaningful interpretation? As the complexity of the competencies being assessed increases, so does the challenge of answering these questions. This heightens the need for a principled design process.

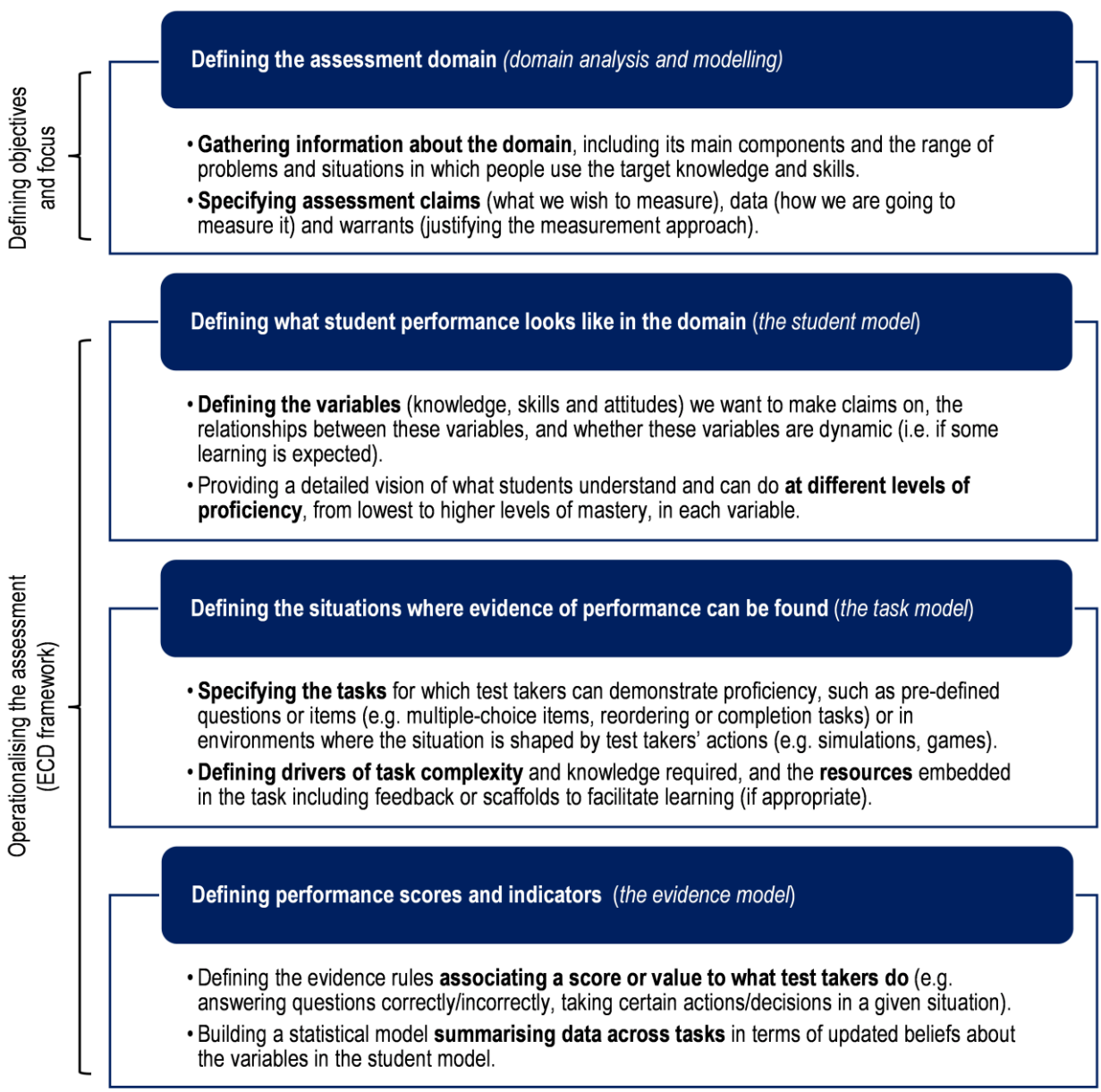
The Evidence-Centred Design (ECD) framework is a tool for making coherent design decisions and is particularly useful in assessing complex competencies like adaptive problem-solving. This framework includes domain analysis, descriptions of target constructs and latent variables, task features, and rules to convert student behaviours into scores that support valid inferences about test takers. ECD connects these elements into a coherent structure, ensuring that theory about competency development, task design and performance metrics are linked by evidence.

The following sections discuss the operationalisation of the phases of ECD for an assessment of adaptive problem-solving. These phases are summarised in the below figure. The analysis of the target domain is foundational. This preparatory work on describing and modelling the domain orients the construction of more detailed test specifications through the three interconnected ECD models: the student model, the

task model and the evidence model. Although the phases are described here sequentially, in practice they are iterative.

Section 3 defines the domain, reviewing the research on adaptive expertise and complex problem solving. The main components of the student model are described in section 4. The task model for assessments of adaptive problem solving is proposed in section 5, where different examples of innovative tasks developed at the OECD and elsewhere are also presented. Section 6 closes the ECD by outlining elements of the evidence model.

Figure 2.2. The iterative phases of an ECD process



The theory of adaptive expertise and its application to the school context

Clearly defining the target domain is critical. If the domain is poorly defined, even the most careful test development and complex psychometric analysis cannot compensate for this flaw. While reading ability is well-understood, competencies like adaptive problem-solving or communication are more difficult to define and assess because of their multidimensional nature and real-world manifestations. The scarcity of models of competency progression increases the challenge of designing valid assessments in these domains.

Domain analysis includes making an inventory of the concepts, language and tools that people use in the target domain, identifying the range of problems and situations in which people use those target knowledge and skills, and defining the characteristics of good performance in those domain contexts. The definition of the domain can be supported by observational studies of how students work on tasks that engage the target skills. In this specific case, domain analysis entails using theories and observations on how experts work on tasks that are novel to them, as a reference for modelling productive learning behaviours at school. Adaptive problem-solving can in fact be conceptualised as the way of solving problems that experienced experts adopt when they face new challenges.

Over the last decades, there has been substantial research investigating the work of experts in different domains. Several models describing the processes involved in solving complex problems have been proposed (Amabile, 1983[7]; Dewey, 1910[8]; Merrifield et al., 1962[9]; Sternberg, 1986[10]). Mumford et al. (1991[11]) identified eight cognitive processes that commonly appear in these models: problem construction, information encoding, category search, category selection, category combination and reorganisation, idea evaluation, solution implementation, and monitoring. Students can consolidate their problem-solving skills by engaging in problems that are sufficiently complex and require the activation of these different mental processes. While most studies have focused on individual problem-solving, some researchers have pointed out that complex problems are often solved by groups. They have analysed how these cognitive and social processes can be activated and mediated in collaborative activities. More recently, research has considered how these problem-solving behaviours can be applied to hybrid environments where humans collaborate with an AI (Akata et al., 2020[4]), showing AI's potential for amplifying humans' unique problem-solving abilities.

Another recurrent observation in the literature is that experts have strong metacognitive skills. While problem-solving, they engage in regulatory behaviours such as knowing when to apply a procedure, planning, predicting the outcomes of an action, questioning the limitations of their knowledge, monitoring their progress, and efficiently apportioning cognitive and emotional resources. The development of metacognitive skills is also key to productive learning at school as it enables students to form mental representations of a problem, select appropriate plans for solving it, and identify and overcome obstacles (Davidson and Sternberg, 1998[12]).

Research has also shown that effective problem-solving also requires well organised knowledge in specific domains. General problem-solving procedures ("weak methods"), such as trial-and-error or hill climbing, are slow and inefficient (National Research Council, 2001[13]) and experts instead use deep knowledge of the domain ("strong methods") to solve problems. This deeper knowledge does not refer to isolated facts, but rather to knowledge encoded in a way that closely links it with its contexts of practice and conditions of use. When experts face a problem, they can readily activate and retrieve the subset of their knowledge that is relevant to the task at hand. For example, chess experts encode midgame situations in terms of meaningful clusters of pieces (Chase and Simon, 1973[14]). Every situation is different, but experts recognize the features and possibilities afforded by recurring patterns (Middle School Mathematics through Applications Project Group, 1998[15]). Students progress in their mastery of a discipline through similar processes of acquisition and use of increasingly well-structured knowledge schema. They consolidate their knowledge of the discipline by reinvesting mental resources through progressively higher levels of challenge (Tynjälä et al., 1997[16]).

Acquiring expertise is a socially situated process. Experts' knowledge is rooted in situations with people who are themselves acting and interacting (e.g. as collaborators, subjects, or adversaries) (Chi, Glaser and Farr, 2014[17]). People thus become experts by participating in the practices of a community of experts and by learning to use the tools, languages and strategies that have been developed within that community (Ericsson, 2006[18]; Mislevy, 2018[19]; Pellegrino and Hilton, 2012[2]). Becoming skilful in any domain involves learning the ways of thinking and acting that are aligned with those valued by a community of experts and by soliciting their feedback. In a similar way, deeper learning in the classroom occurs when students engage collaboratively in activities that are realistic, complex, meaningful, and motivating, and when they can call upon the experience of knowledgeable others for guidance and support.

Qualitatively different types of expertise can be identified. Hatano and Inagaki (1986[20]) distinguish between "routine experts" and "adaptive experts". Routine experts continue honing their skills to perform them with greater efficiency over time, while adaptive experts are characterized by their flexible, innovative, and creative competencies within the domain (Hatano and Oura, 2003[21]). Adaptive experts' knowledge representations are more flexible, allowing them to respond to novel situations more effectively (Schwartz, Bransford and Sears, 2005[22]). Their strong metacognitive skills are also important for them to invent new procedures that go beyond well-established processes, and when tasks involve effortful searching and development of new alternatives (Kozlowski et al., 2001[23]).

Researchers have argued that an excessive exposure to the same type of problems may be an impediment to creativity and adaptability (Davis, Rimm and Siegle, 2011[24]; Weisberg, 2006[25]). The simple force of habit may inhibit creative thinking in adult experts, as well as in students. An often-cited example is Luchins' (1942[26]) water jug task. In this experiment, participants were given 3 water jars, each with the capacity to hold a different amount of water. They must figure out how to measure a certain amount of water using these jars. The same procedure was the most effective one for the first set of problems. However, when the problem parameters were changed, participants continued to apply the same solution even though a simpler one was available, demonstrating the so-called "Einstellung effect" (Luchins, 1942[26]). The Einstellung effect illustrates how the repetition of the same tasks can lead to functional fixedness, or the automatic, habitual selection of previously known solutions (Duncker, 1945[27]) and suggests the importance of deliberatively interrupting routine habits for helping students become adaptive problem solvers.

To what extent is adaptive problem-solving something that students can acquire and that school practices can influence? Traditional types of teaching and learning emphasising memorisation and repetitions may have a detrimental effect on the capacity of students to avoid functional fixedness and be creative problem solvers. A focus on the acquisition of large amounts of information at the expense of knowledge creation is a recipe for making routine experts rather than adaptive ones (Hatano and Inagaki, 1986[20]). On the other hand, appropriate instructional approaches can support students in looking beyond the obvious problems and toward asking the surprising questions that can lead to new insights and ideas. Studies have shown that learners in error-encouraging instructional settings are more likely to take risks and improve adaptive transfer of expertise (Kapur, 2008[28]; Keith and Frese, 2008[29]; Schwartz and Martin, 2004[30]). Learners who try to invent their own solution to ill-structured problems near the "edge of chaos" early in the learning process become more adaptive and creative problem solvers than those not encouraged to freely and safely approach the edge of chaos (Kapur, 2008[28]). The practice of productive failure within safe learning environments cultivates students' preparedness to innovate.

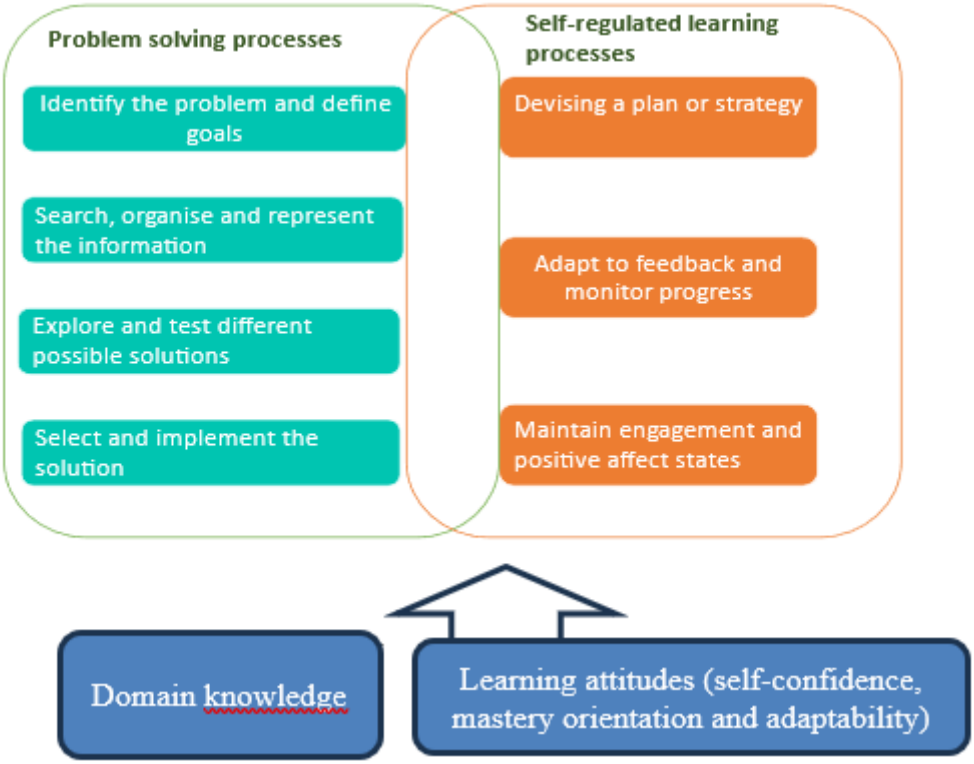
This short summary of the research on adaptive expertise provides useful guidance for outlining a model of competences that describes adaptive learners. Based on this literature, we can claim that students' adaptive problem-solving competences can be revealed by the kinds of questions they ask and the strategies they adopt when they are faced with a problem they have not seen before. Their willingness to let go of initial assumptions and invent new solutions when standard methods do not work represent other markers of their adaptive expertise. This review also highlights the critical role of well-structured knowledge

for solving non-routine problems. We cannot expect students to demonstrate adaptive problem-solving in domains they know nothing about. Finally, we have learnt that experts become experts in a community using social regulation skills and interacting with other people's ideas. It is thus important to design an assessment environment where students are not restricted to their own knowledge, but can call on the help of mentors, peers or other external resources. The findings from the domain analysis highlight that adaptive problem-solving is about making "good choices". A valid assessment of adaptive problem-solving should thus assign more weight to the choices students make in the problem-solving process, than to the correctness of their final responses.

A competency model for adaptive problem-solving

The competency or student model defines in detail the variables (Knowledge, Skills and Attitudes, or KSAs) that the assessment can make claims on and the relationships between these variables. When adaptive problem solvers face a problem, they are not fully familiar with, they work to clarify their goals, understand the concepts and relationships among the elements of the problem, monitor their understanding, and choose and evaluate actions that lead toward the goal. The competency model for adaptive expertise integrates two core components: proficiency in adopting the sequence of processes needed for solving non-routine problems, and self-regulated learning skills. The two components are strongly interrelated: students' problem-solving skills determine the need for activating specific regulation, metacognitive and affect regulation strategies, such as seeking help or persisting. In turn, the ability to regulate one's effort and monitor progress are essential to solving non-routine problems. These cognitive and metacognitive abilities are supported by well-organised knowledge of the domain(s) of application, and by a set of attitudes motivating students to engage with complex problems and to iterate until they reach a satisfactory solution.

Figure 2.3. Competency model for adaptive problem-solving



Problem-solving processes

Identify the problem and define goals

In the situations that are relevant for assessing adaptive expertise, the problem to solve might not be fully explicit. For example, scientists often begin their research by finding important problems with existing theories and methods that others have failed to notice. This can lead to new, productive research that otherwise might not have been pursued. Students who have developed adaptive problem-solving see in most situations the opportunity to take creative actions, not regarding inconveniences and inefficiencies as inevitable. They build a coherent mental representation of the problem situation, define their own achievable goals in the situation, question why things work in a given way and whether they can work better in a different way, and anticipate potential future problems. They consider a problem from multiple vantage points rather than foreclosing on a more immediate and smaller set of possibilities.

Search, organise and represent the information

For many routine problems it is not easy to consider all the relevant information without experiencing a strain on short-term memory capacity. As the problems we work on increase in complexity, it becomes more and more difficult to keep track of all the information. Experienced problem solvers explore the information available in the environment, make decisions on which information and affordances are worth using and which information can be ignored. They create an internal model of the environment using encoding processes, and then often organise this information by creating external representations, such as diagrams or maps. External representations can give people access to knowledge and skills that are unavailable from internal representations (Zhang, 1997[31]).

Explore and test different possible solutions

Adaptive learners engage in divergent thinking when they face a complex problem. They experiment with the affordances in the problem environment and try out new ideas to see if they help. They make progress by building and testing prototypes that help them anticipate the outcomes of particular strategies. Differently from routine learners, adaptive learners can break out of performance scripts and search for different solutions, try something counterintuitive when everything else fails, approach tasks from a different starting point, and construct new methods when needed (Duncker, 1945[27]; Schank and Abelson, 1995[32]).

Select and implement the solution

Divergent thinking processes go hand in hand with convergent thinking process, through which the learner selects one solution among other possible ones and implements it. When selecting the best solution, they consider many factors simultaneously, including the effort required, the chances of success and the expectations of the community.

Self-regulated learning processes

Devising a plan or strategy

Experienced and adaptive problem solvers tend to take a very careful, systematic approach to problems. Finding a solution involves planning the problem-solving process by devising a strategy to reach all sub-goals and breaking complex problems into simpler ones that could each be solved more easily. In many cases, there will not be just one possible sequence of operations and achieved sub-goals; rather, there will be alternative solution methods that need to be evaluated against each other regarding possible costs,

success probabilities etc. Searching for a solution also involves selecting appropriate devices and communicating and co-ordinating with other parties. Effective planning reduces the likelihood of feeling overwhelmed, helps in prioritising tasks, and ensures that no crucial steps are missed. Two forms of planning are ineffective when facing complex problems: "rigid planning" that does not allow for any detour from the course of action, and "vagabonding" that implies dropping a plan and starting a new one whenever a difficulty arises. Adaptive planners are capable of formulating plans that are neither rigid nor vagabond, anticipating possible plan revisions.

Adapt to feedback and monitor progress

Adaptive problem solvers systematically look at the effects of their strategy and search for information about progress towards established goals, actively seeking external feedback. This component of the competency model refers to a critical awareness of one's understanding of the task demands and monitoring of one's thinking and learning processes. Students who are prepared for future learning can identify their knowledge gaps and effectively adapt cognitive strategies based on their emergent understanding. They also systematically test their solutions for effectiveness and generality, engage in appropriate help-seeking behaviours when needed and act on this help or external feedback. At the end of a period of work, students can reflect on their performance and evaluate the extent to which they have successfully achieved their goals and met the task requirements.

Maintain engagement and positive affect states

Adaptive problem solvers manage their motivation and emotional states while learning and persist in the face of difficulty (Fredricks, Blumenfeld and Paris, 2004[33]; Järvenoja et al., 2018[34]; Kim et al., 2015[35]). Affect – one's emotions, moods, feelings and attitudes – closely interacts with learners' motivation and engagement with learning tasks (Efklides, 2011[36]). Positive affect can provide students with the internal resources they need to control their focus and commitment towards achieving their learning goal, whereas negative affect might compromise learners' motivation and effort (Efklides, 2011[36]). Students' capacity to maintain engagement and positive affect is indicated by the fact they avoid prolonged periods of inactivity or unproductive actions and can effectively counter feeling of frustration and boredom.

Domain knowledge

In addition to these cognitive, metacognitive and affect regulation processes, another strong predictor of problem-solving is the solver's level of domain knowledge. Solving problems requires knowledge of and familiarity with the specific objects to be acted on as well as the methods for transforming those objects to move to the goal state. However, this domain knowledge must be well integrated in order to support problem-solving, meaning that learners need to have a clear understanding of how concepts within a domain are interrelated, and connect different domains of knowledge if needed. As discussed in the domain analysis, if prior knowledge is limited to routine repetition or memorisation, it can also hinder adaptive problem-solving. In science, for example, learners with pre-existing (especially faulty) ideas about the relationships between variables are often more likely to ignore anomalous data (Chinn and Brewer, 1993[37]).

Supporting attitudes

Knowledge and cognitive and metacognitive processes are necessary but insufficient requirements for solving problems, especially complex and ill-structured ones. Successful problem-solving requires several affective dispositions as well. Their self-confidence and perception that a goal is attainable affect the mindful effort and perseverance that students apply to solving the problem. Mastery orientation, referring to the goal of mastering a task according to self-set standards, is another important disposition of adaptive

learners. Mastery-orientated learners find intrinsic satisfaction in acquiring more knowledge and completing challenging tasks, and are less influenced by external performance indicators, such as grades. Students who have mastery goals also tend to engage in activities that will increase their knowledge, pay more attention, are more likely to process information at a higher level, and are not afraid to ask for help. They also tend to consider negative feedback as valuable information on how to improve and they treat failures as a learning experience, not as a sign of insufficient ability (Dweck and Leggett, 1988[38]). Adaptability to novelty, uncertainty and change is another attitude that is likely to influence problem-solving processes and outcomes (Martin et al., 2013[39]).

Task model for adaptive problem-solving

General characteristics of adaptive tasks

The literature distinguishes two main classes of problems: well-structured and ill-structured problems. Ill-structured problems include elements that are unknown, have multiple solution paths, result in solutions that can be evaluated according to several criteria, and require learners to make judgments and often also to express personal opinions. Well-structured problems focus on correct, efficient solutions and provide less scope for interpretation and choice.

An assessment of adaptive expertise should be composed, for the most part, of ill-structured problems. The tasks should provide students with opportunities to wrestle with the problem in depth, following iterative processes of reasoning and doing. Tasks should also allow for different solution strategies that may lead to different, yet reasonable outcomes. Moreover, they should be interactive and resource rich. The authentic tasks suited for an assessment of adaptive problem-solving are innovative with respect to traditional assessment items in three main, interconnected ways: 1) they provide opportunities for invention and learning; 2) they integrate intelligent feedback; 3) they use low-floor and high-ceiling performance tasks.

Providing opportunities for invention and learning

We can make robust claims about students' preparedness to learn new things by studying how they work on problems they have not encountered before and thus need to learn how to solve (Roll, Aleven and Koedinger, 2009[40]; Schwartz and Martin, 2004[30]).

One promising method involves designing assessment tasks that work as "invention activities". In this class of tasks, students have to solve problems that involve concepts or procedures that they have not yet been taught (but are related to material they have been already exposed to). Successful students can invent their own original approaches to these novel problems, and in this process, they tend to make mistakes and fail to generate canonical solutions. However, experimental evidence shows that students who learn through invention activities are better at 'transfer' (i.e. solving other tasks that involve the same knowledge schemes but in a different application) in comparison to students who are first told what to do and then practice (Kapur and Lee, 2009[41]; Loibl, Roll and Rummel, 2016[42]; Roll, Aleven and Koedinger, 2009[40]; Taylor et al., 2010[43]). Observing how students work through the invention activity can thus provide evidence on whether students can work as adaptive experts, revising their procedure when it does not work, looking for patterns and making interpretations.

In traditional tests, students cannot use anything else but their existing knowledge – and if they don't know the relevant procedure, there is little they can do to progress (Schwartz and Arena, 2013[44]). In the real-world, people can access resources: they can compare the challenge to previous assignments, search the internet for similar problems, or ask someone for directions. Similarly, assessments that challenge students to create knowledge or solutions that are new to them should incorporate relevant resources. These

resources should be carefully crafted so they do not give the solution away, but rather provide opportunities to learn more about the problem and the solution space they should actively explore.

The research on the design of learning scaffolds has mostly focused on digital learning platforms. In the HERA system, for example, three types of learning supports are described and offered after a student makes a mistake (Arieli-Attali et al., 2019[45]): (1) "Rephrase" (i.e. a rewording of the question that explains in more detail what is expected); (2) "Break it-down" (i.e. providing the first out of several steps required to answer the question); and (3) "Teach-me" (i.e. a written or visual explanation of the main concepts and operations required, with illustrative examples). Other ways to provide opportunities for learning exist, and these can be either on-demand or prompted by specific actions and outcomes in the environment. These resources must be designed with the same level of rigour that is put into the design of the task itself, establishing explicit connections to the claims one wants to make about students' use of these resources. For example, if a purpose of the assessment is to evaluate how students acquire fluency in a given operation (such as interpreting two-dimensional graphs), then providing them with a sequence of practice exercises focusing on that specific operation would be a justified resource. However, if the interest is rather in students' ability to transfer their knowledge (as in an assessment of adaptive expertise), then worked examples or contrasting cases represent a better way to provide scaffolding that is aligned with the assessment arguments.

Integrating intelligent feedback

In addition and complementary to providing resources that students can use to make sense of a problem and start inventing solutions, the tasks of an assessment of adaptive problem-solving should consider including guidance during the solution process in the form of advice, feedback or prompts. This type of instructional support can promote deep learning in beginners and enable the observation of the decisions they make in their learning (Azevedo and Aleven, 2013[46]). Targeted feedback and interventions can also reduce the risk that beginners disengage from an assessment because they perceive it to be beyond their capacities. The advent of generative AI has re-defined the types and quality of feedback that can be incorporated in learning and assessment tasks. The feedback generated by modern AI models is much more adaptive and richer. At the same time, however, how this feedback is generated is often unknown and unclear, making it more difficult for users to decide on its appropriateness and value.

Real-time feedback can play a variety of functions to improve assessment including: 1) engaging student's interest when they appear disengaged; 2) increasing their understanding of the requirements of the task; 3) reducing degrees of freedom, or the number of constituent acts required to reach a solution; 4) maintaining direction; 5) marking critical features, including discrepancies between what the student has produced and what they would recognize as correct; 6) demonstrating or modelling solutions, for example reproducing and completing a partial solution attempted by the student; 7) eliciting articulation and reflection (Wood, Bruner and Ross, 1976[47]).

In the context of large-scale assessment, feedback to students needs to be automated. This is challenging, because effective feedback is both task and tutee dependent: the feedback system must be based on a complete model of the task's demands, affordances, and solution space, and at the same time, the feedback must adapt to the performance and actions of the student. Without attending to both, the system cannot generate feedback that is useful for all students, failing to bring each student to their zone of proximal development (Vygotsky, 1980[48]). Artificial intelligence holds promise for answering to this challenge, at least for some types of learning and assessment experiences. Another challenge is related to the observation that students often do not seek for feedback or consult resources in interactive learning or assessment environments. It is important to design them so that they are not too intrusive and distracting, and at the same time they are sufficiently visible and accompanied by explanations that invite test-takers to use them.

Figure 2.4. ILA Game Creator interface and in-game feedback

Source: OECD's Platform for Innovative Learning Assessments (PILA), https://pilaproject.org/.

Using low-floor and high-ceiling performance tasks

All students should be able to demonstrate their ability to learn and progress by using the tools and resources available to them, no matter their initial level of knowledge or skill. Adapting assessment challenges to different abilities not only improves the quality of the measures and but also the authenticity and attractiveness of the experience. In real life, people seldom take on challenges that they find too easy or impossible to achieve; in traditional tests, this happens quite frequently.

One approach to catering to differently able students involves designing tasks that have 'low floors' and 'high ceilings', meaning that they are accessible to all students while nonetheless challenging top performers. These types of problems are much more difficult to design than the standard problems found in traditional tests, where the item is matched to one specific level of difficulty and there is only one right response. One cluster of low-floor, high-ceiling problems asks students to produce an original artefact: this

could be a story, a game, a design for a new product, an investigation report on some news, a speech, etc. These more open, performance tasks generate a wide range of qualitatively distinct responses, and even top performers have incentives to use resources that can help them produce a solution that is more complete, richer and unique. These type of extended response tasks are seldom used in large-scale assessment because of the costs and difficulties associated with human scoring: new technologies based on large language models now allow automated evaluation of complex artifacts, potentially reducing this issue. The low floor, high ceiling design can be used also in the context of more standardised problem-solving tasks, making clear to students that there are intermediate targets to achieve and that they are expected to progress as much as they can towards a sophisticated solution.

Adaptive designs can also address the complexity of measuring learning in action amongst heterogenous populations of students. A relatively simple way to cater to differently able students involves creating scenarios where students have a complex goal to achieve, and they progress towards this goal by completing a sequence of tasks that gradually increase in difficulty (similar to a 'level-up' mechanism). More proficient students will quickly complete the initial set of simple tasks, after which they will encounter problems that challenge them. Less prepared students are still able to engage meaningfully with the tasks and demonstrate what they can do, even if they do not complete the full sequence. Both groups of students work at the cutting edge of their abilities, with obvious benefits in terms of measurement quality and test engagement. With current technologies, this design could be further improved by introducing multiple, adaptive paths within a scenario: on the basis of the quality of their work, students are directed on-the-fly towards easier or more difficult sub-tasks.

Contexts for problem-solving activities

A student's performance in these types of assessments depends on their knowledge or prior experience of situations that have similar patterns to the ones presented in the assessment. In other words, the domain of application clearly matters when it comes to student performance in adaptive problem-solving tests and consequently the interpretation of their performance. It is therefore critically important in the assessment design process to make explicit and motivated choices on the type of situations the students will encounter. If the assessment aims to make general claims on students' adaptive expertise, then it is important to ensure a sufficient diversity of tasks. Diversity can be evaluated according to two fundamental characteristics of a task situation: the domain knowledge required to engage with the task; and the purpose of the problem-solving activity.

Balancing disciplinary and cross-disciplinary contexts

Traditional assessments in education typically focus on specific disciplinary areas, such as mathematics, biology, or history, and emphasise the reproduction of acquired knowledge and procedures. Integrating assessments of adaptive problem-solving alongside these traditional methods can better balance the evaluation of disciplinary knowledge with students' ability to apply that knowledge flexibly to new, authentic problems.

An adaptive problem-solving assessment in a school subject can encourage students to engage in real-world practices that reflect how disciplinary knowledge is used professionally and in everyday life. For example, in science, an assessment of adaptive problem-solving would use a digital environment to involve students exploring a scientific phenomenon in a virtual lab, making decisions similar to those of professional scientists. In history, students could identify biases in a historical account in a videogame where they travel back in time, collaborating with other students' avatars and virtual agents.

While the task design innovations described above should enhance all subject-specific assessments, there is also value in applying them in contexts beyond traditional school subjects. Life outside school is not

organized by subject, and tasks that span multiple disciplines may better reflect the integrated knowledge-building activities that develop 21st-century competencies.

Research supports the idea that "epistemic games," where students simulate professional roles, effectively develop transversal problem-solving competencies in an interdisciplinary way. These immersive, technology-enhanced games allow students to take on the job of doctors, lawyers or engineers, and the skills they learn transfer beyond the game. For example, students learning to investigate news reports as journalists gain critical thinking skills useful in any career. Many other professional roles require integrating knowledge from various disciplines and applying interpersonal skills to solve unfamiliar problems. Some innovative assessments already simulate professional tasks, requiring students to draw on knowledge from multiple disciplines. These simulations of professional work can be designed so that they embed an assessment of students' performance including all the task features described in the previous section.

Relevant activities in assessments of adaptive problem-solving

What type of activities should student complete in an assessment of adaptive problem-solving? While "all in life is problem-solving" (Popper, 2013[49]) not all problems are equal. Different kinds of problem-solving in different contexts and domains call on a different combination of knowledge and skills. The cognitive and self-regulation process that are included in the competency model above are also applied differently to different classes of problems. As part of the task modelling, it is important to be specific about the type of problems that students should solve. Jonassen (2000[50]) proposes a typology including 11 different types of problems: a) logical, b) algorithmic, c) story, d) rule-using, e) decision making, f) troubleshooting, g) diagnosis solution, (h) strategic performance, i) case analysis, j) design, and k) dilemma. For simplicity, we propose that new assessments of adaptive problem-solving should focus on three typologies or clusters of problems: 1) information problems; 2) optimisation problems; 3) design problems. Ideally, making general claims on students' adaptive problem-solving competence requires an assessment that includes activities in all these three clusters, acknowledging that it is possible to design extended assessment activities that cover multiple clusters (e.g. an activity in which students investigate a social issue by analysing information, and then design a solution to mitigate the issue).

Information problems

In this cluster of activities, the main problem-solving or learning goal for test takers consists of searching for and using information to reason about a problem and communicate a conclusion. These activities focus on how students interact with various types of media and information resources and can be applied to virtually any context of practice.

The sequencing of tasks in this activity cluster should require students to identify their information needs, locate information sources in online or offline environments, extract, organise and compare information from various sources, evaluate the quality of information and reconcile conflicts in the information, and make decisions about what information to share with others and how.

Several existing assessments focus on these type of information problems and incorporate the general task design principles described above. In the United States, the National Assessment of Educational Progress (NAEP) Survey Assessments Innovation Lab (SAIL) "Virtual World for Online Inquiry" project (Coiro et al., 2019[51]) developed a virtual platform simulating a micro-city world, where students are presented with an open inquiry challenge (e.g. to find out whether an historical artefact should be displayed in the local museum). Students must build their knowledge by planning an inquiry strategy with a virtual partner, asking questions to virtual experts, searching for information in a web environment or a virtual library, and using different digital tools to take notes and redact a report. The environment includes several adaptive design features (e.g. hints, prompts and levelling) to help students regulate their inquiry processes and to encourage efficient and effective information gathering. Similar assessments can also be fully

integrated within learning experiences, with evidence about students' competencies extracted in a "stealth" way by analysing the sequences of choices students make during their inquiry processes in addition to the final outcome of their information search and synthesis.

Assessments in this activity cluster should also test students on their capacity to evaluate (mis)information and conduct fact-checking in open, networked information environments (Ecker et al., 2022[52]). Next-generation assessments might draw inspiration from existing digital games and simulations. For example, in "The Misinformation Game", learners can engage with posts in ecologically valid ways by choosing an engagement behaviour (with options including liking, disliking, sharing, flagging and commenting), and they are provided with dynamic feedback (i.e. changes to their own simulated follower count and credibility score) depending on how they interact with posts containing either reliable or unreliable information (van der Linden, Roozenbeek and Compton, 2020[53]).

Optimisation problems

In this cluster of activities, the main problem-solving or learning goal is to model a phenomenon or engineer a desired state within a dynamic system. This might involve troubleshooting a misfunctioning system, generating and testing hypotheses about faulty states, or exploring a simulated environment with the goal to produce or achieve a certain output. In short, what unites this cluster of activities is that learners have to generate their own understanding about how a (complex) system works through their interactions and experimentation with a given set of tools and then use this understanding to achieve a particular outcome or make some kind of prediction. The assessment environment functions as a micro-world in which students can make decisions about which variables to manipulate and how. The environment dynamically changes either as a function of the sequence of decisions made by students or independently of them (or both).

Engaging in these types of activities emphasises the inquiry and problem-solving practices that are the focus of modern science and technology education, such as conducting reasoned experiments, understanding systems and engineering solutions. Typically these activities require students to plan and execute actions systematically, observe, interpret and evaluate changes resulting from their interventions, and adapt their strategies based on their observations. As such, this activity cluster works particularly well when contextualised within scientific disciplines.

However, these practices are also relevant in many real-life contexts beyond scientific disciplines and these types of problems also require significant metacognitive and self-regulated learning skills. This is in part due to the various sources of complexity that these types of problems may include related to: 1) the number of different variables; 2) the mutual dependencies between variables; 3) the role of time and developments within a system (e.g. the time between an action and observed effect); 4) transparency about the involved variables and their current values; and 5) the presence of multiple levels of analysis, with potential conflicts between levels (Dörner and Funke, 2017[54]; Wilensky and Resnick, 1999[55]). This cluster of activities can therefore also provide valuable information on how well students can address complexity and uncertainty, and how persistent and goal-oriented they are.

Since the early 1980s, researchers have developed simulations of complex problems in different contexts in order to examine learning and decision making under realistic circumstances; see work by Berry and Broadbent, *On the relationship between task performance and associated verbalizable knowledge* (1984[56]), or Fischer, Greiff and Funke, *The history of complex problem solving* (2017[57]), for example. In one micro-world developed by Omodei and Wearing (1995[58]), students played the role of a Chief Fire Officer and had to combat fires spreading in a landscape using truck and helicopter fire-fighting units. The micro-world depicted a landscape comprising forest, clearings and property, the position of initial fires, the position of fire-fighting units, and the direction and strength of the wind. The problem state of the micro-world changed both independently (e.g. as a result of changes in the wind) and as a consequence of the

learners' actions. Task performance in the assessment was measured as the inverse proportion of the number of cells destroyed by fire.

More recently, many micro-worlds have been developed to assess inquiry and decision-making processes in the context of science, technology, engineering and mathematics (STEM) education. One interesting example is Inq-ITS virtual lab (Gobert et al., 2013[59]), a web-based environment in which students conduct inquiry with interactive simulations and the support of various tools. In one Inq-ITS simulation, students examine how the populations of producers, consumers and decomposers are interrelated with one another. Students are asked to stabilise the ecosystem, and in order to solve the problem they have to form a hypothesis, collect data by changing the population of a selected organism, analyse the data by examining automatically-generated data tables and population graphs, and communicate the findings by completing a brief lab report. Measures of students' skills are derived from the analysis of the processes they follow while conducting their investigation. Similar scenarios have been developed in the PISA 2025 assessment of Learning in the Digital World (OECD, 2023[60]).

When it comes to designing the kinds of micro-worlds described here, one challenge – particularly in the context of summative assessments – relates to the level of complexity to include within the system. Simple micro-worlds with limited affordances, such as the Micro-Dyn problems used in the 2012 PISA problem-solving assessments (Fischer, Greiff and Funke, 2017[57]), do not require an extended familiarisation process for learners. They can also typically present several shorter problems to students in time-limited assessment windows as compared to more complex systems that are characterised by multiple non-linear relationships, moderating variables and rebound effects; this in turn can increase the reliability of measurement claims as well as facilitate the generalisability of those claims (as evidence is accumulated by observing how students solve different problems with different tools). However, aiming to minimise complexity is not necessarily the best approach as simple simulations might not yield sufficiently valid insights into the way students deal with complexity and uncertainty, an essential element of adaptive problem-solving (Dörner and Funke, 2017[54]).

The third cluster of activities that are relevant to include in an assessment of adaptive problem-solving engage students in creative work resulting in a variety of purposeful and expressive products. These practices and resulting products can be associated to a variety of disciplinary contexts, from the engineering space (e.g. inventing a new product) to the expressive (e.g. producing a work of art or writing a poem). Creative design problems can also clearly be cross-disciplinary, and expose students to the exploration, design and presentation processes that are central to many professional domains (Blikstein, 2013[61]; Martinez and Stager, 2013[62]).

Design problems are open and relatively unstructured, in the sense that they include many degrees of freedom in the problem statement (which might only consist of desired goals, rather than achieving a specific objective or outcome). Because the problems are ill-structured, learners also must engage in extensive problem structuring (Goel and Pirolli, 1992[63]). This ambiguity also extends to how students' products should be evaluated because responses tend to be neither right nor wrong, only better or worse. Moreover, design making is an iterative activity that is not created in a vacuum: typically, the product created by the student relates to the end goal of satisfying a "client", which in turn requires students to consider different perspectives during the design process.

Assessments of adaptive problem-solving using this cluster of activities should monitor how students engage throughout the entire design process, from the initial phases of idea generation and formation (via prototyping) through to the completion and review of a product in response to external feedback. Ideally, these assessment activities would allow learners to move naturally between phases of active designing and more reflective review of their work, and evidence should be collected both on the final product and on the processes in which students engage while developing their ideas.

To date, the majority of assessments focusing on design and creative activities have been conducted in the formative space. Some of these have developed sophisticated and multidimensional rubrics to evaluate the quality of students' final products as well as their processes of invention and self-reflection (Lindström, 2006[64]). Performance tasks replicating authentic design processes have been much rarer in summative and large-scale assessments. Beyond the constraints of available testing time, other challenges relate to providing students with resources for engaging in creative production (e.g. physical tools) and to assigning objective scores on the quality of students' work at scale – especially if the intended use of the assessment is to compare performance across different linguistic and cultural student groups. There is, however, potential in adapting best practices that have been trialled in classroom settings to a summative context (e.g. by reducing expectations on student products or by providing them with a partially-developed product they need to finish or improve), and some performance assessments have been used successfully both at small and large scale. For example, the Assessment of Performance in Design and Technology was administered to 10,000 15-year-olds in the United Kingdom (Kimbell et al., 1991[65]).

Evidence models for assessments of adaptive problem-solving

Every task developed for the assessment must have a detailed evidence model describing how student responses and interactions with the digital test environment will be parsed into observables that are useful for analysis. The evidence model should be derived from theory-based assumptions about what constitutes adaptive problem-solving and learning in the specific context of the activity.

Unlike in standard assessments, evidence-bearing opportunities in complex assessment tasks are not limited to how students respond to pre-defined questions. Evidence of relevant KSAs can also be extracted by observing what test takers decide to do (or not) in a simulation or game – often referred to as 'stealth assessment'; see (Shute, Rahimi and Lu, 2019[66]), for a review. Computer-generated log files contain in-depth information or process data about the behavioural patterns that students employ to solve complex problem-solving tasks. Understanding this often complicated and indirect path to the final outcome in a test-taking situation provides important information on what students are actually able to do and where they might fail in similar tasks.

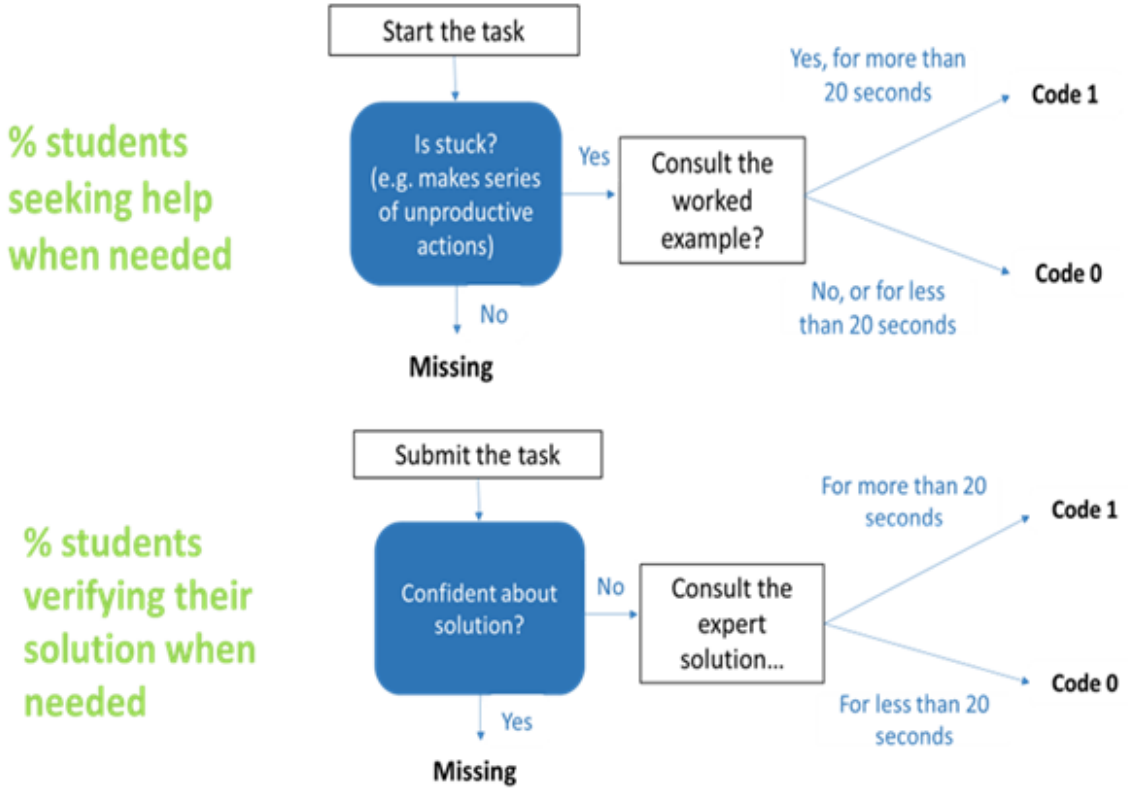
The evidence from process data can be used to improve performance indicators, augmenting the available evidence that is used to construct the proficiency score. For example, Scalise (2017[67]) shows that we can more precisely estimate students' capacity to solve complex inquiry tasks in a science simulation by combining evidence from student responses to standard multiple-choice questions with evidence based on behaviours (e.g. whether the student decides or not to test multiple samples of water in a science game). Another important application in the context of an assessment of adaptive problem-solving consists in expanding the metrics that are made available to users: by using this evidence from behaviour it is possible to go beyond the single score typical of large-scale assessments such as PISA, and develop richer descriptions of what students tend to do when presented with problem situations similar to the ones in the test. Moreover, by collecting digital traces of students' attempts to solve multi-step problems, it is possible to gather rich diagnostic information on the typical mistakes students make. This more nuanced and descriptive reporting strategy can be very useful to orient policy or instructional responses to the assessment results.

In terms of reporting, it is important to summarize this complex information in ways that are appropriate given the nature of the data and of the inference. The observed outputs of the problem-solving process provide information that can be described along a continuum, from low-ability to high-ability. A simple continuous scale like the PISA one (mean of 500 points and a standard deviation of 100) can thus be used to represent how well students have solved the problems in the test.

However, this approach may not be suitable for describing the second component of adaptive problem-solving: self-regulated learning processes. Self-regulated learning depends on a student's knowledge

state, making it more complex to interpret. For instance, seeking help from a digital tutor indicates effective self-regulation only for students who are struggling. Given this complexity, a more descriptive approach may be preferable for reporting self-regulated learning. Cluster or latent class analyses, which categorize students based on behavioural patterns (e.g. trial-and-error strategies vs. fewer, more deliberate attempts), provide a contextual interpretation that better reflects these processes.

Figure 2.5. Example of indicators for self-regulated learning behaviours



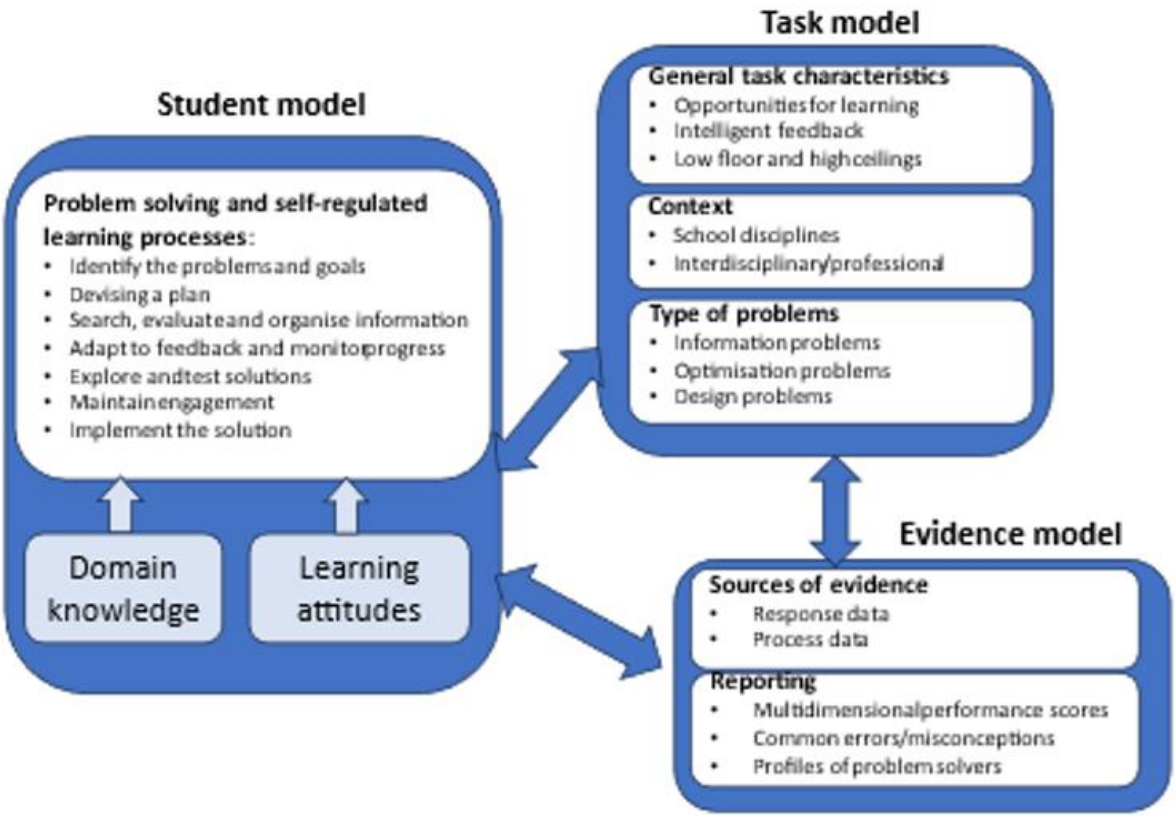
Interpreting the meaning of event sequences in the log data is not always straightforward: for example, when students do not take any actions, it is difficult to distinguish between those students who are taking a reflective pause and those who are simply disengaged. This means that all evidence rules and resulting indicators for self-regulated learning processes need to be extensively validated.

These indicators on self-regulated learning processes will be combined for reporting with the objective of shedding light on opportunities to improve students' learning skills in digital environments. Students will be classified into profiles according to how much progress they make towards the learning objectives during the unit and according to the self-regulated learning processes they demonstrate. For example, one such profile might represent "engaged learners" who make progress in their knowledge by using the learning resources and acting on feedback in an effective way. Other students might be grouped together because they share the characteristics of "confused guessers" who perform many actions with no logical connection and achieve no progress. Countries will be compared on the basis of how many of their students belong to each profile.

Bringing everything together: an assessment model for adaptive problem-solving

The previous sections have described an initial sketch of an evidence centred design for an assessment of adaptive problem-solving. The figure below summarises the main elements of the student model, the task model and the evidence model.

Figure 2.6. Evidence-centred design model for assessing adaptive problem-solving



In the student model, we have specified general cognitive, metacognitive and conative processes that students should adopt in order to solve complex, ill-structured problems. We have also argued that the successful deployment of these processes depends on the students' access to robust knowledge schema in the domain, and on their mastery orientation and self-beliefs.

Moving to the task model, we have clarified that problem-solving is not a uniform activity, and students have to adapt the processes in the student model according to the type of problem they have to solve. Three types of complex problems are particularly valuable for a student assessment of adaptive problem-solving: information problems, optimisation problems and design problems. These problem typologies can be applied to different disciplinary areas or contextualised in multi-disciplinary situations such as simulations of professional work. Finally, the tasks included in an assessment of adaptive problem-solving have some general characteristics: they invite students to learn about the problem and construct their own solution, they are adaptive to the students' level of expertise and they are solved through multiple iterations following intelligent feedback.

The evidence required to make claims on adaptive problem-solving competences is complex. Technology-enhanced tasks generate rich streams of event data that can be productively analysed to produce indicators of problem-solving and self-regulation processes. In order to serve well the needs of

the users of these assessments, this complex evidence should be summarised in multi-dimensional reports. These reports go beyond the single scale that is currently used in large-scale assessment, including diagnostic information on misconceptions and profiles assigning students to different types of problem solvers.

Conclusion

Everyone, in their everyday and professional lives, regularly solves problems. Few people are rewarded for memorising information and responding correctly to knowledge quizzes, yet traditional instruction and high-stake examinations put major weight on these skills (Jonassen, 2000[50]). The few problems that students do encounter at school tend to be well-structured ("what is the sum of this number and this number?") and do not prepare them for many of the challenges they will need to solve in their everyday lives ("How can I get this person to pay attention to me?") or professional lives ("What kind of marketing approach is appropriate for this new product line?"). Therefore, at the end of their studies even the students that graduate with good marks are often not adequately trained to adapt and thrive in everyday social and professional contexts. The discrepancy between what learners need (experience in solving ill-structured problems) and what formal education provides can be reduced by innovating instructional practices. However, there will be limited incentives to change instruction if assessments do not change. By modelling the constructive experiences that promote deep learning and flourishing, innovative assessments of adaptive problem-solving can act as powerful engines of change in education practices.

Assessments that aim to measure how prepared students are for future learning engage students in active and authentic problem-solving processes. They reproduce key features of situations in which people interact with others, evaluate available resources, make choices about what to focus on and disregard as well as the course of action to take, try out multiple strategies and adapt according to the results.

The rapid development of digital technologies, and of AI tools in particular, opens new opportunities for assessing adaptive problem-solving. Many of the constraints in test design, administration and scoring of students' work in open tasks no longer apply due to technological and data analytic advances. The digital toolbox available to test developers now dramatically expands assessment design opportunities and affordances, with the potential to make test experiences less artificial and the evidence more valid. However, technology alone is not sufficient to achieve valid measurement. Assessment design remains a fundamentally human design enterprise. Different communities of experts need to work together collaboratively to find solutions to the many conceptual and technical challenges noted in this paper and those yet to be uncovered. Designing a test like the PISA Learning in the Digital World required years of collaborative work of domain experts, test developers, psychometricians, UI experts, as well as several round of reviews from national teams. Enlisting creative people from multiple backgrounds and perspectives to the enterprise of assessment design and use, and facilitating collaboration among them, is critical.

Creating and using these innovative assessments at scale will also require significant political and financial capital. In fact, efficiency considerations have led to preferring short, discrete tasks over longer, performance activities. A big assessment industry has flourished through the global marketing of this type of instruments. Using many short items provides reliable data on whether students master a given set of knowledge and can execute given procedures. However, if the purpose of assessment is evaluating whether students can construct new knowledge in choice-rich environments, then we must give them the time and affordances for reflective activities and multiple iterations. We must give students choice and agency on how to learn within the assessment, and advance research on analytical models that can convert complex sequences of digital actions into evidence of problem-solving and learning skills. The examples shown in this paper demonstrate that the assessment of educationally and socially significant competencies like adaptive problem-solving is not only desirable but also possible. Innovation sharing on

a global scale, through more investments in collaborative research and open-source repositories of task models and technology solutions, may well be the best and only way to achieve such advances.

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2.2. Ethical competency

While the overarching purpose of education is widely recognised as preparing individuals for a flourishing life, a critical question remains: which competences—encompassing knowledge, skills, and attitudes—or virtues are essential to achieve this goal? The High Performing Systems for Tomorrow project (OECD, 2024[1]) adopts an Aristotelian perspective on human flourishing, drawing on the work of Kristján Kristjánsson (2019[2]).

However, it is notable that, in addressing what is needed for human flourishing, the conceptual paper does not engage with Kristjánsson's other works on Aristotle's account of virtues and moral education (2022[3]; 2015[4]; 2007[5]), nor with contributions from other scholars who have developed the Jubilee Centre Framework for Character Education in Schools (2022, 2017, 2013[6]).

The Character Education Framework highlights the importance of virtues—moral, civic, intellectual, and performance virtues—alongside practical wisdom (*phronesis*) (Kristjánsson et al., 2021[7]) as an integrative virtue, in fostering human flourishing. It emphasises that cultivating good character and virtues is essential to achieving this overarching aim. A neo-Aristotelian model for moral development underscores three key elements: virtue knowledge and understanding, virtue reasoning, and virtue practice.

The OECD paper (2024[1]) argues that Education for human flourishing involves ethical reasoning, adaptive problem-solving, interpreting the world, appreciating the world and acting in the world.

Furthermore, it is stated that:

> *"Ethics equips us to evaluate and respond to the claims that others make on us. An ethical perspective combats prejudice against people who are different from us and balances our needs with the rights of other species and the planet. Ethical reasoning enables altruistic choices. It combines intellectual humility; the ability to balance diverse viewpoints, perspectives, and contexts; and an orientation toward the common good and shared humanity. It is Education for human flourishing's foundation stone."*

We agree that fostering ethical competence is a vital component of education, yet there is no agreement on what it consists of. Before engaging in reflective analysis, however, it is essential to address certain terminological ambiguities. Since ethics can be understood in both descriptive and normative senses, it is important to clarify what is meant by ethics in the context of key competences. It is also necessary to clarify the meaning of ethical reasoning. In some contexts, the term is used as a general reference to ethical thinking, while in others, it denotes a specific sub-competence of ethical competence.

The aim of this paper is to investigate the composition of **ethical competence** as a general competence and its contribution to human flourishing. Specifically, we examine the connections between ethical competence and other competences, such as value competence and cultural competence, as outlined in the Estonian national curriculum. By exploring these relationships, we aim to clarify how ethical competence interacts with and strengthens other general competences, such as value, cultural, and communication competence.

General competences in the Estonian national curriculum

The Estonian national curriculum includes 8 general competences, which can also be interpreted as transferable competences. General competences are cross-curricular and cross-disciplinary competences. They are developed through learning outcomes pursued in all subjects, as well as through the treatment of transversal subjects in lessons and extracurricular and out-of-school activities. The development of general competences is supported and guided by teachers in mutual co-operation as well

as in co-operation between the school, home and community. The development of competences is described in the school curriculum.

The National Curriculum for Basic Schools (2023[8]) defines **cultural and value competence** as:

> *"the ability to evaluate human relations and activities from the standpoint of generally accepted moral norms; to sense and value one's ties with other people, the society, nature, the cultural heritage of one's own country and nation and those of others, and events in contemporary culture; to value creativity and shape a sense of aesthetics; to value general human and societal values, to value human, cultural and natural diversity; to acknowledge one's value judgements."*

The National Curriculum for Upper Secondary Schools (2023[9]) **defines cultural and value competence** as*:*

> *"the ability to evaluate human relations and activities from the standpoint of generally accepted moral norms and ethics; to sense, analyse and value one's ties with other people, the society, nature, the cultural heritage of one's own country and nation and those of others as well as the events of contemporary culture; to value art and creation and shape a sense of aesthetics; to value general human and societal values, to value human, cultural and natural diversity; to acknowledge one's values and take them into consideration when making decisions; to be tolerant and co-operative and contribute to the achievement of joint objectives."*

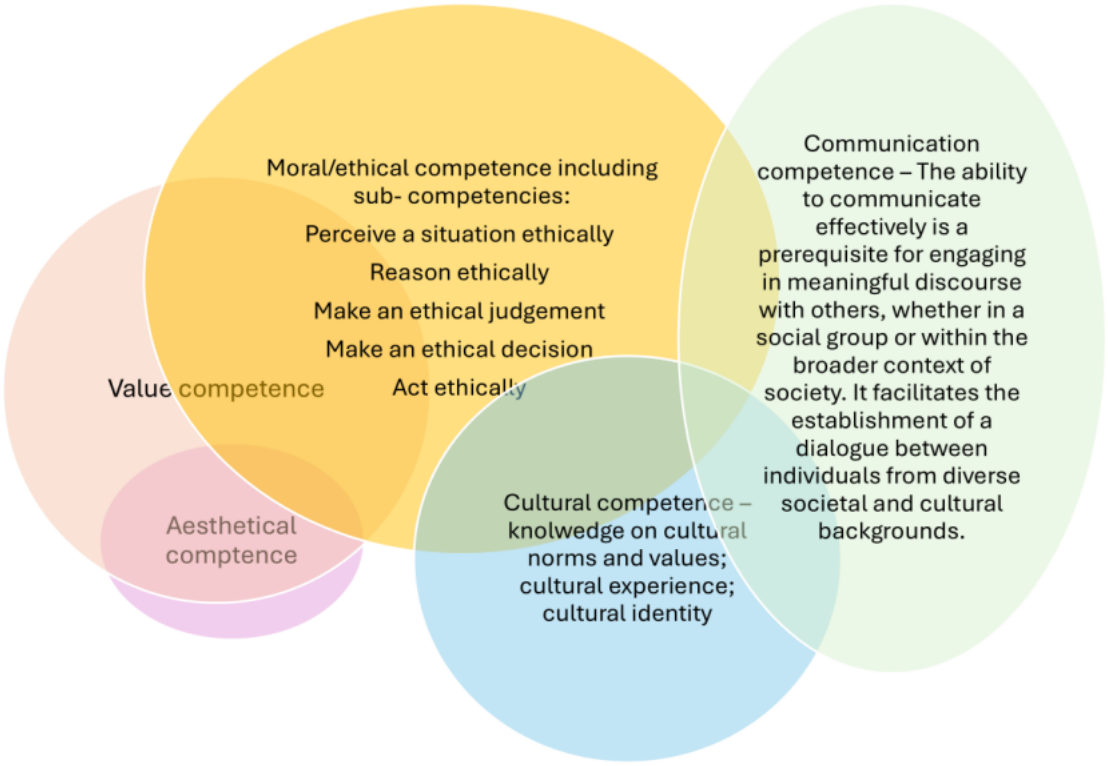
The current definitions in the curriculum have several shortcomings, including vague terms such as "generally accepted moral norms" or "valuing relationships," and an overemphasis on individual values. Consequently, the concept of cultural and value competence in the Estonian curriculum requires further systematic development. One notable issue is that the curriculum does not specify how to cultivate ethical competence through the development of specific knowledge, skills, and habitual dispositions.

In the below figure we propose that broader ethical competence is needed to complement the value and cultural competences currently included in the curriculum. Furthermore, while aesthetic competence is mentioned (underlined) as part of value and cultural competence, it should be distinguished as a separate competence. Aesthetic competence is closely linked to value competence—for instance, our evaluation and understanding of beauty and art vary across cultures. However, it extends beyond value competence by incorporating the skills required to create beauty.

Both moral and cultural competences also depend on the development of communication competences. Individuals must be able to engage in dialogue about their value choices and actions. In the Estonian curriculum, communication competence is categorised as a field-specific competence rather than a general competence, and its relationship to cultural and value competence warrants further clarification.

For example, engaging in value-based debates requires the ability to listen to dissenting opinions, which presupposes both listening skills and the habitual disposition to understand differing perspectives. It also involves the ability to argue one's views constructively. Therefore, it is insufficient for individuals to merely justify their own choices or understand others' values. In a society, it is essential to develop negotiation skills that enable individuals to reconcile differing values and reach shared understandings.

Figure 2.7. Proposed model of general competences



All of these general competences would also require a **taxonomy**, allowing the teacher to assess the student's development and support their learning in the zone of their nearest development.

In Estonia, several studies have been conducted in the 21st century on factors that influence the cultural and value competence of students. For example, it is known that the development of the student's cultural and value competence is influenced by different socialisers such as his or her family, school, peers, media and society (Tamm, 2020[10]). At the same time, since the concept of moral development is undeveloped and, as said, there is also no taxonomy of the aforementioned general competences, it has not been possible to investigate what is the didactically best way to support the moral development of students. Hence, we propose that the first step should be the conceptual clarification of ethical competence.

In relation to the concept under discussion, it is important to acknowledge the varying approaches adopted by different authors in their treatment of concepts. Consequently, the subsequent model has been formulated to be as comprehensive as possible. It should be noted that the comparison of these diverse approaches has not been incorporated into the explanatory section of the model.

Terminological issues

The term *ethics* derives from Greek, while *morality* originates from Latin. Today, ethics and morality are frequently used interchangeably, although the philosophical discipline remains primarily referred to as *ethics*. The term ethics is used in two primary senses, in descriptive and normative sense:

- **Descriptive ethics/morality** refers to codes of conduct established by a society, group (e.g. religion), or individual.
- **Normative ethics/morality** refers to a code of conduct that rational individuals, under specified conditions, would universally endorse (Gert and Gert, 2020[11]).

The descriptive sense often rejects universal application, as seen in anthropological studies of diverse societal norms. In contrast, the normative sense frequently emphasises rationality, impartiality, or social coexistence.

Both definitions, descriptive and normative, require clarification (Gert and Gert, 2020). Descriptive definitions must distinguish morality from other normative systems, such as laws or etiquette, and specify which societal codes qualify as ethical/moral. Normative definitions must address what constitutes rationality and the justification of ethical/moral claims—areas of ongoing philosophical debate.

Descriptive definitions encounter difficulties in diverse societies lacking a universally accepted code of conduct. Normative definitions posit that morality represents a behavioural code universally endorsed by rational individuals under specific conditions. Differences persist regarding the criteria for rationality, the scope of ethics/morality, and its obligations. Some theories extend ethics/morality to all rational agents, while others limit it to human-like beings. Normative theorists often assert that ethics/moral requirements are overriding and should not be violated for non-moral reasons.

Moral disagreements and their implications

Normative theories diverge on the foundations of moral goodness. Deontological ethics emphasises duties and universal principles, teleological ethics focuses on maximising benefits, and virtue ethics seeks balance through the virtuous mean (Walker and Lovat, 2018[12]). One can distinguish between four possible sources of moral disagreements: incommensurable fundamental values, different concepts of the good life, different motivating reasons and different concepts of morality (Sutrop, 2020[13]).

Persistent moral disagreements have theoretical and practical consequences. The absence of definitive arguments for controversial positions can foster relativism or subjectivism. Even among rational, well-informed individuals, unanimity is unlikely due to differing values and priorities.

Moral disagreements raise practical concerns about coexistence, particularly in political or religious conflicts, which can escalate into severe consequences. Marino (2015[14]) emphasises the importance of "case consistency," judging similar cases similarly and avoiding arbitrary distinctions. Improved reasoning and principled prioritisation of values—such as fairness and benevolence—can help resolve moral dilemmas. Marino (2017[15]) also advocates collective efforts to reduce conflict by honoring shared values, forming the basis of a "common morality" (Beauchamp and Childress, 1979[16]). Agreements on universally undesirable values can provide a foundation for coexistence (Berlin, 1947/2013[17]).

Ethical reasoning and its conceptualisation

Ethical reasoning can be understood as a subset of practical reasoning—specifically, reasoning aimed at deciding what to do and, when successful, culminating in the intention to act. In decision-making, ethical reasoning involves forming judgments about what one ought, morally, to do. Asking what one ought morally to do, therefore, constitutes a practical question—a specific inquiry into action.

Philosophical examinations of ethical reasoning pose significant challenges, such as understanding how moral considerations are recognised, managing conflicts among them, and determining how they motivate action. At the same time, they offer opportunities to gain insights into what we ought to do based on how we reason about these decisions (Richardson, 2018[18]).

A key question is whether ethical reasoning is distinct from practical reasoning more broadly. Different moral theories provide contrasting models of moral reasoning. Aristotle's approach, for instance, emphasises selecting means to ends and identifying the components of a desired activity. The reasoning of a virtuous person differs from that of a vicious person not in structure but in content: the virtuous person pursues true goods, while the vicious person is misled by apparent ones.

In contrast, Kant's categorical imperative offers a distinct model of practical reasoning. It evaluates the universalizability of the maxims underlying actions, in contrast to prudential reasoning, which aims to maximise happiness. Intermediate views, such as Hare's utilitarianism and Aquinas' natural law theory, provide alternative frameworks. Hare's ideal moral agent employs rationality to maximise both personal and others' preferences, facilitated by empathy. Thomistic natural law theory emphasises the unity of practical reasoning in pursuing the good but prohibits deliberate violations of fundamental human goods.

The role of education

A key challenge for schools is equipping young people with the skills for ethical reasoning in a world of diverse values, frequent dilemmas, and engagement with individuals who hold fundamentally different beliefs. Moral education should focus on fostering critical reflection, principled value prioritisation, and the ability to navigate complex disagreements constructively.

We regard ethical competence as a general competence that must be developed to prepare young people for a flourishing life. It is useful to distinguish between educating young people for different spheres of life—namely, work life, civic life, and personal life—as outlined in the Estonian Curriculum.

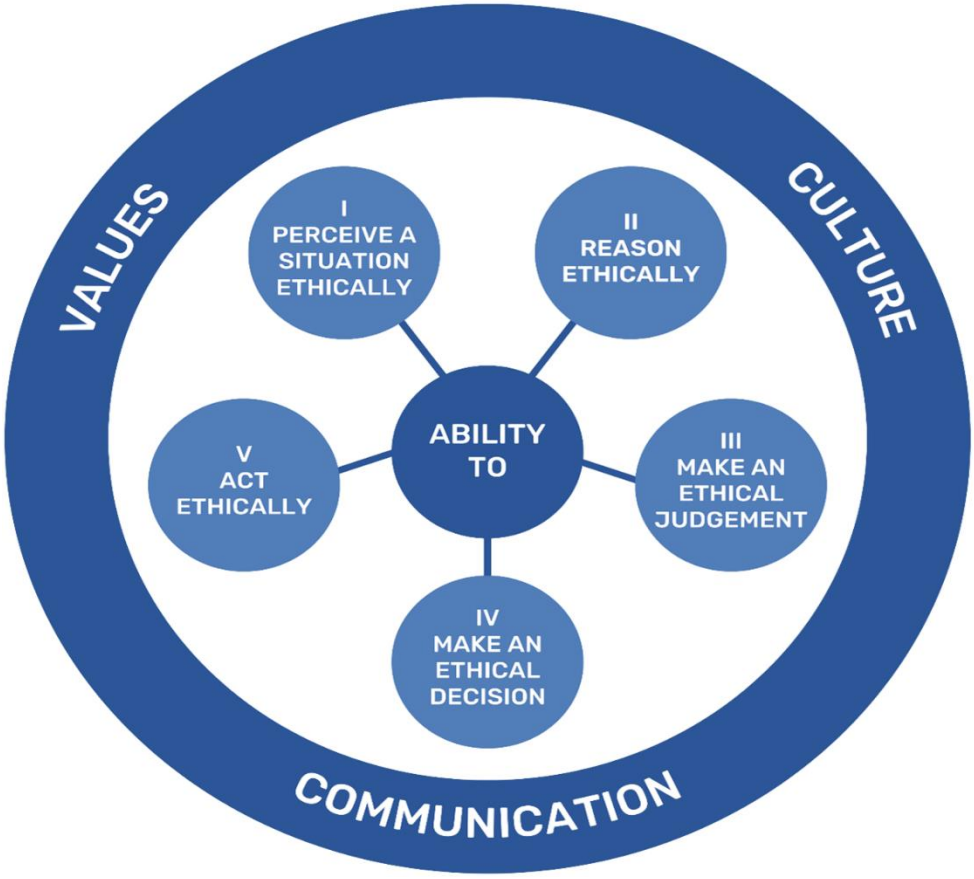
Many global educational and developmental frameworks (e.g. UNESCO's key competences for sustainability in (2017[19]) and OECD's 21st-century competences (2018[20]) emphasise ethical reasoning, empathy, and responsible action as critical components of global citizenship and societal progress. Ethical competence equips individuals to address modern ethical challenges, including technological, environmental, and social challenges.

Ethical competence enables individuals to recognise ethical or moral issues, reason through them, make judgments, decide ethically and act responsibly. It serves as the foundation for consistent and principled actions across personal, professional, and societal contexts. Additionally, ethical competence supports other key competences, such as critical thinking and problem-solving, social and emotional competence, and self-expression.

Promoting moral/ethical competence involves the development of **five sub-competences**:

1. Ability to perceive a situation ethically
2. Ability to reason ethically
3. Ability to make ethical judgments
4. Ability to make ethical decisions
5. Ability to act ethically.

Figure 2.8. Model for ethical competence



When implemented in practice, the sub-competences in question do not follow a linear relationship. To illustrate, consider the case of Anna, who has become habituated to unequal treatment in her organisation. As a result, her ability to ethically perceive situations involving unequal treatment within this context is limited. However, when presented with a constructed narrative in which a character faces a dilemma about resisting unequal treatment, Anna is able to provide reasoning regarding the situation and offer an assessment of the character's behaviour.

Furthermore, Anna may have made a well-argued judgment that lying about a depression diagnosis to family members is wrong. Nevertheless, she chooses not to reveal the truth, believing that temporarily concealing her mental health struggles will allow her family a brief period of carefree time. By withholding the truth, Anna fails to act in accordance with her judgment.

Although there is no direct linear relationship between sub-competences, all sub-competences encompass knowledge and skills that must be mastered, to some extent, for the application of ethical competence to occur.

For instance, the ability to engage in ethical reasoning requires first noticing that an ethical issue exists in a given situation. While individuals' inherent ethical sensitivity varies, it can be enhanced through practice. Knowledge and skill levels can be delineated using a taxonomy. For example, when two children quarrel over a toy and the teacher gives the toy to the child who starts crying, another child may intuitively perceive the teacher's action as unfair. The child may also have learned to label such situations as unfair with adult guidance. At a subsequent stage, the child may develop the ability to understand who acted unfairly and

towards whom. As ethical development progresses, the child learns to discuss the situation argumentatively and may even take steps to address the perceived injustice.

Conversely, it is also possible to conceptualise a scenario where a child, having become accustomed to possessing toys without challenge, begins to take them from others by force. This dynamic effectively inculcates the child with a prevailing norm, without fostering any awareness of the potential ethical implications of their actions.

The subsequent section provides an overview of the components of ethical competence, along with the knowledge, skills, and habitual dispositions that must be cultivated for its development.

The description of certain skills is repeated across different components. This repetition aims to provide a comprehensive account of each component. All related knowledge, skills, and habitual dispositions can be developed at varying levels, as outlined by relevant taxonomies (though the development of such a taxonomy falls outside the scope of this paper).

For example, a student might be able to envision the consequences of an ethical decision in different contexts: for themselves, for individuals they know, or for society as a whole. Additionally, they may consider either a single possible outcome or multiple potential consequences.

Ability to perceive a situation ethically

The ability to perceive a situation ethically involves recognising and understanding the moral dimensions of a situation. Theoretical underpinnings of this ability include the concepts of **ethical sensitivity**; e.g. Weaver (2007[21]) and **ethical awareness** (Rest, 1986[22]). Perceiving a situation ethically also entails understanding how actions affect others and interpreting situations from multiple perspectives (Löfström, 2012[23]; Tammeleht, 2022[24]).

It aligns with the concept of **moral imagination**—the ability to foresee the moral consequences of actions and distinguish between emotional responses and objective appraisals (Clarkeburn, 2002[25]). Moral imagination allows individuals to put themselves in the shoes of others, including perceiving the situation from the perspective of an impartial spectator (Sutrop, 2000[26]; Smith, 1759/1976[27]), considering alternative perspectives and potential outcomes, which is crucial for ethical decision-making (Johnson, 2016[28]; Werhane, 2002[29]; 1999[30]). On the moral sensitivity scale can also occur “moral myopia,” (a distortion of moral vision that prevents moral issues from coming into focus), and “moral muteness” (people stop talking about moral issues) (Drumwright and Murphy, 2004[31]).

The ability to perceive a situation ethically is a foundational skill for ethical competence, serving as the first step in ethical reasoning, judgment, and decision-making. Recognising moral issues requires a highly developed set of cognitive and emotional capacities. Ethical sensitivity involves complex behaviours, intentions, emotions, and perceptions (Weaver, 2007[21]).

Key Components:

1. Recognition of Ethical Issues
    a. Identifying moral considerations and actors involved.
    b. Distinguishing ethical concerns from technical, legal, or practical issues.
2. Ethical Sensitivity
    a. Understanding how actions affect stakeholders.
    b. Recognising others' emotions, needs, and motivations.
3. Understanding Moral Context
    a. Interpreting actions in their broader cultural and institutional context.

   b. Interpreting how specific actions align or conflict with societal values, norms, and ethical principles.
4. Awareness of Consequences
   a. Understanding the potential short-term and long-term impacts of decisions and actions on individuals, groups, and society.
   b. Recognising unintended consequences or secondary effects that may not be immediately apparent.
5. Perspective-Taking and Empathy
   a. Considering diverse viewpoints and using empathy to understand others.
   b. Using empathy to better understand how others might experience or interpret the situation.
6. Conceptual Understanding
   a. Applying ethical concepts like fairness and justice to analyse situations.
   b. Using these concepts to interpret what is at stake and why the situation might pose an ethical challenge.
7. Moral Imagination
8. Envisioning outcomes and alternative solutions.

Educational implications:

Developing the ability to perceive situations ethically involves fostering:

- **Awareness training:** Exercises that encourage recognising moral dimensions in everyday situations.
- **Role-playing and scenarios:** Activities that require students or professionals to identify ethical issues from various perspectives.
- **Reflection practices:** Discussion activities that focus on understanding the moral aspects of past decisions or experiences.

Ability to reason ethically

Ethical reasoning involves systematically analysing moral issues to determine justifiable actions, balancing principles, values, and consequences. It emphasises consistency, objectivity, and logical coherence. A contentious issue in ethical reasoning is whether principles play an implicit or explicit role in well-conducted moral deliberation.

For the moral reasoner, an essential task is to identify the morally salient features of a situation. Prerequisites for ethical reasoning include knowledge of prevailing values and an understanding of the context, including relevant facts, potential consequences, stakeholders, and loyalties. As ethical reasoning involves recognising moral dilemmas, prioritising values, and justifying decisions to others, effective communication skills are essential.

Through moral reflection and theorising, individuals can develop a principled approach to weighing values. This process also involves increasing awareness of biases—such as emotions, self-interest, and contextual influences—while emphasising case consistency, achieved by comparing judgments of priority to other judgments in relevant, similar cases (Marino, 2015[14]).

Key Components:

1. Critical Analysis
   a. Breaking down ethical situations into key elements.

2. Application of Ethical Principles
    a. Using frameworks like utilitarianism, deontology, or virtue ethics.
3. Considering Multiple Perspectives
    a. Acknowledging diverse viewpoints and cultural influences.
4. Resolving Conflicts
    a. Balancing competing values and loyalties.
5. Evaluating Consequences
    a. Assessing short- and long-term impacts.
6. Addressing Biases
    a. Recognising and mitigating personal biases.
7. Logical Reasoning
    a. Using clear arguments and ensuring consistency.
8. Reflection and Theorising
    a. Learning from past decisions and refining reasoning skills.

Educational implications:

To develop the ability to reason ethically, education and training programs should focus on:

- **Case studies:** Analysing real-world scenarios to practice ethical reasoning.
- **Scenario building exercises:** creating narratives concerning moral dilemmas from the point of view of different actors.
- **Discussion and debate:** Encouraging critical dialogue about complex ethical dilemmas.
- **Role-playing:** Simulating ethical decision-making in diverse contexts.
- **Reflection:** Group discussions to deepen understanding of ethical principles and their application.

Practical Tools for Ethical Reasoning:

- **Potter's Box Framework:** A method for identifying facts, values, principles, and loyalties to guide ethical decision-making.
- **Case Analysis:** Comparing the current situation with similar past cases to ensure consistency in ethical reasoning.
- **Ethical Theories:** Drawing on established frameworks like Kantian ethics, consequentialism, or virtue ethics to evaluate actions.
- **Dilemma Games:** For example, Estonian values games. A method of analysing different options, making a choice. justifying one's decision, listening to others and trying to reach consensus.

Ability to make ethical judgments

The ability to make ethical judgments involves the cognitive and evaluative processes necessary to determine what is morally right, fair, or just in a given situation. Cultural factors often influence ethical judgment, given socio-cultural variations within and between societies. It is a critical aspect of ethical competence, requiring both analytical and moral capacities.

This ability integrates reasoning to evaluate moral options and justify decisions. It emphasises clarity, consistency, and accountability.

Key Components:

1. Identifying Moral Dimensions

   a. Recognising ethical implications and context.
2. Evaluating Options
   a. Assessing actions based on values, principles, and consequences.
3. Application of Ethical Principles
   a. Balancing justice, beneficence, autonomy, and fairness.
4. Using Moral Reasoning
   a. Ensuring logical, unbiased judgment.
5. Contextual Awareness
   a. Considering cultural and situational influences.
6. Justification of Judgments
   a. Clearly articulating and defending moral decisions.

In summary, the **ability to make ethical judgments** involves evaluating possible actions against ethical principles, and justifying the chosen course of action. It requires an integration of moral awareness, intellectual reasoning, and a commitment to ethical values.

Educational Implications:

Developing the ability to make ethical judgments involves fostering:

- Critical thinking skills to analyse complex ethical dilemmas.
- A strong moral foundation, including knowledge of ethical theories and principles.
- Emotional intelligence to recognise and manage personal biases and emotional influences. Communication skills to justify and share ethical decisions with others.

Ability to make ethical decisions

Ethical decision-making involves selecting morally appropriate actions, integrating reasoning with practical implementation. The ability to make ethical decisions involves recognising ethical dilemmas, evaluating options with moral reasoning, and selecting a course of action that aligns with ethical principles and values. It requires a combination of analytical rigor, moral courage, and practical follow-through to ensure that ethical decisions translate into meaningful actions. The ability to make ethical decisions is fundamental to acting ethically. The educational implications of the ability to make ethical decisions focus on developing critical thinking, empathy, self-awareness, and the practical application of ethical frameworks. By fostering these skills and mindsets, education prepares individuals to navigate ethical dilemmas effectively and responsibly in their personal, professional, and societal roles.

Key Components:

1. Recognising Ethical Issues
   a. Identifying dilemmas and moral considerations.
2. Clarifying Values
   a. Prioritising ethical principles when values conflict.
3. Evaluating Options
   a. Considering consequences for all stakeholders.
4. Applying Ethical Frameworks
   a. Using moral theories to guide decisions.
5. Contextual Awareness

    a. Balancing universal principles with specific circumstances.
6. Critical Thinking
    a. Avoiding biases and ensuring logical reasoning.
7. Moral Courage
    a. Choosing ethical actions despite challenges.
8. Effective Communication
    a. Articulating and justifying decisions transparently.
9. Commitment to Action
    a. Ensuring ethical decisions are implemented.
10. Reflection
    a. Reviewing outcomes and taking responsibility.

Educational Implications:

- **Case Studies:** Analyse real-world and hypothetical dilemmas to practice decision-making.
- **Role-Playing:** Simulate ethical scenarios to explore perspectives and actions.
- **Debates and Discussions:** Encourage dialogue on ethical issues to refine reasoning.
- **Reflection Exercises:** Promote self-awareness of values and biases.
- **Collaborative Projects:** Engage in group decision-making to practice ethical deliberation.

Ability to act ethically

Moral action involves implementing ethical decisions and behaving in accordance with one's values and judgments, often in the face of obstacles. This involves acting in a way that upholds fairness, justice, and the well-being of others.

Acting ethically requires integrity, consistency between one's values, beliefs, and actions, even when faced with external pressures or temptations to act otherwise. Also, it requires the capacity to translate intentions into actions.

It requires ethical motivation—the internal drive to prioritise and uphold moral values in decisions and actions. Moral motivation bridges the gap between understanding what is ethically right and committing to act on that understanding.

Unlike moral reasoning and decision-making, moral behaviour is influenced by external factors, such as other actors, practices, and the context in which the moral agent operates. The individual follows through on ethical intentions and decisions, ensuring that their actions align with their moral values and ethical reasoning.

Acting ethically translates moral insights into behaviour, requiring integrity, empathy, and courage to prioritise ethical values over competing goals.

Key Components:

1. Moral Integrity
    a. Consistency between beliefs and actions.
2. Motivation and Courage
    a. Prioritising ethics over personal gain and facing challenges.
3. Empathy and Altruism
    a. Recognising others' needs and minimising harm.

4. Practical Implementation
    a. Turning decisions into meaningful actions.
5. Accountability
    a. Reflecting on actions and addressing unintended consequences.

In summary, **acting ethically** is not isolated from other moral competences, such as reasoning and decision-making. However, it goes beyond these by focusing on the translation of ethical insights into action. The ability to act ethically bridges the gap between knowing what is right and doing what is right, requiring not just intellectual understanding but also moral courage, practical wisdom, and accountability.

Educational Implications:

In educational settings, it is crucial to empower students to analyse daily practices from the perspective of moral action. Promoting the ability to act ethically involves:

- Training students to plan ethical action
- Encouraging reflection on how to implement moral choices effectively.
- Developing skills like self-discipline, critical thinking, and empathy to support ethical behaviour.
- Taking responsibility for one's actions, making reflection on the outcomes of moral acts an essential component of this competence.

Our recommendations

We recommend understanding ethical decision-making and ethical reasoning as essential sub-competences within the broader framework of ethical competence. Developing ethical competence involves fostering five key sub-competences:

- The ability to perceive a situation ethically,
- Reason ethically,
- Make ethical judgments,
- Make ethical decisions, and
- Act ethically.

Ethical competence is a general competence essential for preparing young people to lead flourishing lives. It is beneficial to address this competence within the distinct spheres of life—work life, civic life, and personal life—as outlined in the Estonian Curriculum.

Ethical competence enables individuals to confront modern challenges, including technological, environmental, and social dilemmas. It equips them to recognize ethical issues, reason through them, make sound judgments, and act responsibly. This competence forms the foundation for consistent and principled actions across personal, professional, and societal contexts.

Ethical competence is closely related with value-based, cultural, and communicative competences:

- **Value Competence** is crucial for engaging with both aesthetic and moral values but extends beyond ethical competence itself.
- **Cultural Competence** involves understanding and navigating diverse social and cultural contexts, remaining distinct from both ethical and aesthetic competencies.
- **Communicative Competence** is vital for meaningful dialogue about values and moral choices within social groups and public discourse. Without the ability to listen, understand, and articulate values and moral disagreements, human flourishing cannot be achieved.

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2.3. Appreciating the world

In the Education for Human Flourishing framework, “aesthetic appreciation of the world” (or “Appreciating the world”) relates to the human enjoyment of nature and the arts. In a way, it corresponds to the traditional education for beauty, one of the three virtues around which Gardner (2011[1]) proposes to educate in the 21st century – alongside truth (associated with science) and goodness (associated with ethics). In the framework, Appreciating the world supplements Adaptive problem solving (associated with science), Interpreting the world (associated with the humanities and social sciences), and Ethical competence (associated with social and emotional skills and philosophy). The overarching competence that unites these areas of knowledge and skills, giving them purpose and meaning for learners, is named “Acting in the world.” While only a few individuals can act in the world as applied or “fine art” artists, education systems have always included arts education in curricula as a way to transmit one of the most universal and fundamental human experiences: the appreciation of beauty in the world, be it manmade or natural.

Aesthetic appreciation has long been tied to one’s immediate surroundings. Since the beginning of the “universal exhibitions” (world expos) in the 19th century, exposure to the culture and art of other world regions has spread and deeply influenced art globally. The emergence of reproduction technology in the 20th century further expanded this access, enabling people worldwide to have access to an “imaginary museum” of the fine arts, or a “museum without walls” (Malraux, 1967[2]). The digital era has significantly enhanced the accessibility and visibility of artistic works and nature, allowing anyone with internet access and interest to explore and become familiar with Pygmy songs, classical Indian or Persian music, almost the entire repertoire of western classical music and pop music, and huge amounts of visual art, music and film. Similarly, anyone can access images of beautiful landscapes, whether close to home or in other countries. While we still all live in a local culture and society, people with internet connectivity now have access to part of the global culture (despite under-representation or invisibility for some cultures and languages) and can acknowledge they live on a shared planet, even if they are not fully aware of the global challenges highlighted by the international community through the UN Sustainable Development Goals.

Appreciating the world gives intentional emphasis to the exposure and understanding of beauty beyond one’s own society and culture. This is a competence based on knowledge, sensorial experience and practice. It should foster the development of better humans and better citizens who value the world and its beauty, are more open minded to challenges and surprises and better understand the multidimensionality and synesthetic aspects of human presence and communication. It is also strongly related to agency and developing the ability to make sense of the world, of oneself, and of others: aesthetic experience comes with unanswered questions that lead us to think, act, connect and ascribe meaning.

Appreciating the world and arts education

There is a long tradition of arts education in OECD countries. In 2023, an average of 11% of curriculum time in primary education and 7% in secondary education was devoted to the arts (OECD, 2024[3]). These percentages have remained relatively stable over the past decades with a modest increase of 1% compared to 2017 at both levels. However, these averages may mask significant variation within countries (Winner, Goldstein and Vincent-Lancrin, 2013[4]), notably in countries with federal systems.[1]

Arts education usually focuses on music and visual arts in school (and less often dance, drama, photography or film studies). In addition, language arts (and sometimes foreign language) curricula devote time to the analysis of domestic and foreign literature. This is mainly justified on cultural, social and aesthetical grounds, and to some extent economic ones. Arts education in school aims to educate children in what is considered beautiful in their society and globally, exposing them to "high" culture that is not necessarily accessible to all families, and ensuring that pupils can experience and contribute to an aesthetic experience. While arts education also teaches the basics of drawing, painting, singing or performing music, it is generally introductory, given the limited time that can be devoted to it. Additional courses, specialised tracks or external institutions, either private or publicly subsidised, often supplement these aesthetic basics for interested and informed families. There are two economic objectives related to arts education: helping children to become connoisseurs and passionate consumers of culture and introducing them to aesthetic fields as possible vocational areas, notably with the growth of the "creative industries" in many countries.

John Dewey (1934[5]) framed art as an experience, emphasising its transformative potential. Gardner (2011[1]) defines aesthetic experience and the appreciation of beauty as a "tingle" that elicits an audible "Ha", and more specifically defines the aesthetic appreciation of an experience in terms of three components: it is interesting, memorable and worthy of revisiting. Defining beauty or aesthetic appreciation as a personal feeling based on experience and knowledge, marked by above-average sensorial intensity (memorable), and a certain level of complexity (worthy of revisiting), avoids basing aesthetic appreciation on the intrinsic qualities of the artwork or aspect of nature that creates this feeling. At the same time, it makes it clear that appreciating the world is based on knowledge and experience, the ability to identify what is interesting and memorable and the openness to revisit the experience either because it was enjoyable or, if not initially, because one is motivated by others, either friends or experts. It also highlights that it is a competence that expands and grows. As Dewey notes, aesthetic experience educates and prepares "a person for later experience of a deeper and more expansive quality" (1938, p. 28[6]).

Ellen Winner's (2022[7]) history of arts education in the United States shows that several different approaches to arts education have prevailed historically and may still exist simultaneously in different parts of the country. Greene et al. (2001[8]) convincingly distinguishes between art appreciation, aesthetic education, and arts education.[2] Art appreciation focuses on the understanding and knowledge of the arts and its different forms, and in some ways does not necessarily imply the practice of any one art form. Aesthetic education goes beyond the arts and aims to make students actively aware of the sensuous world, "whether in a work of art, on a sidewalk, in the woods, or when looking out one's window" (Winner, 2022, p. 74[7]). As for arts education, it may include some of these objectives but also has a focus on developing technical skills in some art forms through the creation and/or copy of art works. While aesthetic appreciation of the world goes beyond arts education, a pragmatic approach is to anchor this competence in arts education and literature classes. As emphasised by Greene (2001[8]), beyond the traditional and new fine arts, literature is also a way to develop appreciation of the world, given its power of highlighting the beauty of everyday life experience.

A long philosophical tradition associates the experience of beauty with the fine arts (whether it is auditory, visual or a mix of the two) and the feeling of the sublime with nature, which can, by extension, be also experienced through the arts. Typically, other types of everyday aesthetic appreciation, for example the beauty of a garden, a well-presented dish, a piece of furniture or book decorations, were often described as "agreeable", "pretty" or "nice." Mathematicians also talk about the "beauty" of a theorem or a demonstration (and other professions may do the same for the greatest achievements in their field). While this is a legitimate usage, it is less related to the broad social understanding of aesthetic beauty and, thus, is more peripheral to the approach proposed here.

While hierarchies of quality and complexity still exist among art sub-cultures, as is often perceived by lay people (Winner et al., 2020[9]), the multiplication of new art forms, such as cinema, photography, graphic novels, digital art, video games, fine dining and olfactive arts, alongside sub-genres within art forms, challenges the idea of focusing only on what were traditionally considered the "high" arts. To put it differently, "understanding the world" highlights the need to combine different ways of thinking about complex phenomena or, at the very least, understand other people's perspectives on similar topics. As presented by Gardner (2011[1]), the world of the arts went through the same transformation, and many challenge "beauty" (in the original meaning) as the main characteristic of quality art, since it can also be provocatively ugly or trivial. At the same time, there is a broader consensus that art sub-genres such as hip hop in music (Shusterman, 1992; 2000[10]) and art from all regions of the world are worthy of study and can provide aesthetic experience of great value. The traditional hierarchies between the art forms may still exist in some ways in terms of ambition and complexity, but they have become more fluid, encouraging greater recognition for the beauty of a garden, a piece of clothing, a game design and a hip hop song, as well as the beauty in a work of art by a celebrated past or contemporary painter, sculptor, composer, architect, photographer, choreographer, theatre or film director.

The aesthetic appreciation of the world, therefore, is a transferable experience from the arts and literature to everyday life – and vice versa. It builds on observation and noticing patterns (or the lack thereof), on sensory development, one one's past aesthetic experience (or just experience) and knowledge of art history and how different artistic forms may work. It can be expanded with knowledge and time, making the individual experience worth revisiting and reassessing. Like any other competence, it is built progressively, and one's judgment and appreciation grow as one becomes closer to being a "connoisseur," as is the case in any other domain. Finally, the appreciation of the world in our times should have a global nature. In the past, aesthetic appreciation was limited to the appreciation of art in one's country or continent. Today, thanks to digital access, one can engage and appreciate the beauty of nature, urban landscapes or the arts from around the globe, spanning all historical periods.

Why Appreciating the world matters

Aesthetic appreciation of the world remains anchored in the knowledge, skills, attitudes and values associated with arts and literature education. In many ways, its rationale in a modern curriculum has not changed. Durkheim (1922, pp. 70-71[11]) defines education as "the means by which society prepares, within the children, the essential conditions of its very existence". Expanding his definition, he says "Education is the influence exercised by adult generations on those that are not yet ready for social life. Its object is to arouse and to develop in the child a certain number of physical, intellectual and moral states which are demanded of him by both the political society as a whole and the special milieu for which he is specifically destined." While Durkheim saw this milieu as a position in the division of labour, one can also interpret it as the country and conditions in which people live. The human flourishing framework puts more emphasis on individual fulfilment, without denying the social and political forces shaping education systems.

First, aesthetic appreciation of the world contributes to the educational goal of providing every child with a holistic education, giving them the opportunity to become rounded persons and citizens. Artistic and aesthetic experiences have been a key dimension of human societies since the beginning of humanity. In fact, there is not a single society across the globe that did not have art and develop artistic artefacts, for a variety of reasons. If education is about the transmission of the most powerful human ways of thinking, being and expressing oneself, then education in beauty and the arts is unavoidable. Developing the competence of appreciating the world prepares children to be knowledgeable and sensitive to different art or aesthetic forms which are fundamental, universal aspects of the human experience, and potentially to beauty in general, whether found in nature, everyday objects or other human beings.

Second, aesthetic appreciation develops a person's sense of meaning and agency. Some argue that the arts, and beauty more generally, provide an element of human elevation. This is perhaps why many art pieces have celebrated religious figures or been used for religious reasons. As Scarry (1999[12]) puts it, beauty is "sacred". A separate philosophical tradition, stretching from Plato to Nietzsche, links the appreciation of beauty to human desire and pleasure (or displeasure) and connects us to the world, to ourselves and to others. As mentioned above, Dewey (1934[5]) described an aesthetic experience as dynamic, incomplete and lasting over time , and so did Gardner (2011[1]). In the same vein, Nehamas (2007[13]) suggests that it is precisely because we do not know why we feel something or someone is beautiful that we want to continue to explore, learn, revisit or re-engage with the experience. Appreciating the world and its beauty can subtly or drastically influence the course of our lives, leading us to other people, other objects and other ways of being.

A third argument is more political. As Hannah Arendt proposed in The Human Condition (1958[14]), works of art contribute to providing us with a stable world to inhabit. As in the past, so too today the arts anchor us in our societies and their history, either reinforcing or critiquing them. Part of the appreciation of the world is to understand our times, to connect us with prior generations and understand past and current rituals. In increasingly polarised societies and amidst rising geopolitical tensions, appreciating the world becomes more essential still. It fosters the ability to understand and take perspectives, respect others' views and production and cultivate self-control. In education systems with an emphasis on "appreciating the world", one would hope that political ideas would not be expressed by the destruction of world´s most breathtaking and culturally significant sites and works of art, as was the case in the world heritage site of Palmyra in 2015-17.

A fourth argument is more social and sociological. One of the objectives of education is to equalise (to the extent possible) people's opportunities in society. As children from lower socio-economic backgrounds are much less likely to have access or exposure to high arts of almost all genres than their more advantaged peers, and also to the wonders of nature, it is essential for schools to provide the access and understanding of the arts and natural beauty that they may not be able to enjoy at home.

Finally, while unpopular among arts educators, there is also an economic, utilitarian rationale to arts education and appreciation of the world. It allows some children to identify a passion and possible vocation in the labour market (e.g. they may become artists or arts teachers or rangers or landscapers). It also contributes to the creative industries and the design of new products. Educating young people to appreciate the world prepares them to be more engaged and sophisticated consumers of the performing arts, exhibitions and tourism—sectors that hold significant economic and cultural importance in OECD countries and beyond. While this is only a secondary reason, it might indirectly contribute to the development of other non-artistic skills, providing collateral benefits that could serve in other school subjects or promote entrepreneurial thinking. For example, there is strong evidence that playing short drama scenes increases reading skills (Winner, Goldstein and Vincent-Lancrin, 2013[4]).

What Appreciating the world is

"Appreciating the world" is defined as the ability to create, observe carefully, analyse, understand, experience and value the beauty found in nature and in various forms of human creation, such as art, across different cultures and world regions, based on the knowledge and practice of different art forms. This should lead to the sharpening of the five senses, notably the visual and auditory senses, and be based on the acquisition of knowledge, skills, attitudes and values. While it includes an academic dimension, this competence also takes into account the sensuous dimension of beauty (and to some extent its situated dimension in cultures and historical periods). Again, grounding this ability in the knowledge and practice of

art forms makes practical sense, given the reality of curricula. It does not imply that this competence could not be grounded in other aesthetic experiences focused on our natural environment or our everyday life.

While appreciating the world could be nurtured in virtually all school subjects, to the extent that they relate to the wonders of the world and its history, geography, mathematical relations, biology and chemistry, the framework intentionally emphasises a conventional approach to aesthetic appreciation and considers arts education and literature in language art classes as its main vehicles. One novelty of the perspective compared to most country curricula is the global opening to the beauty of nature and the arts. This does not imply that local art traditions and appreciations of beauty should not play a central role, but that part of the competence lies in being aware of more remote and less familiar views on appreciating the world.

Skills and knowledge

The main knowledge and skills that "Appreciating the world" aims to develop include creativity, critical thinking, communication and collaboration.

While knowledge and skills are presented separately, there are in fact no skills without knowledge or knowledge without skills. The content and procedural knowledge can be understood as the technical skills in the arts; creativity and critical thinking represent higher order thinking skills in the arts; and communication and collaboration embody the socio-emotional skills in the arts. As the focus goes beyond arts education toward aesthetic appreciation, there should be some ideas of transfer towards other competences – a dimension that the framework makes easier, thanks to the overarching competence of "Acting in the world."

Content knowledge:

Knowledge of different forms of the performing and fine arts, including digital art, and of places of natural beauty. This knowledge encompasses some widely recognised historical and contemporary milestones in different art forms as well as the knowledge of vocabulary to describe art and nature and the emotions they express.

Procedural knowledge:

Practice in different art forms, including digital art. It should be acquired by performing or making art. Part of its acquisition could be achieved through copying existing pieces, but the largest part should be through making one's own pieces of art and discussing them. As far as natural beauty is concerned, this could be done through photography, video or the celebration of nature through the arts.

Creativity:

The ability to make novel pieces of art, applying one's own ideas to meet some pre-set constraints or objectives, making connections with one's knowledge and experience of the world and building on one's knowledge of the arts.

Critical thinking:

The ability to articulate a reasoned judgment about the beauty of nature or a piece of art after carefully observing and analysing it in terms of composition and expression, to understand its underlying aesthetic logic within its genre, linked to its artistic, cultural and historical context where relevant, and to identify the strengths and, if any, the weaknesses of the work.

Communication:

The ability to describe different types of artwork, natural and manmade beauty, from different genres, cultures and historical periods, and the feelings and emotions they aim to induce (and do induce in oneself) with adequate vocabulary as well as the ability to communicate using aesthetic criteria and reasoning, be it through the arts or as an enrichment of other forms of communication (e.g. a presentation, decorating a room, etc.).

Collaboration:

The ability to contribute to a collective art performance, the creation of a collective piece of art or communication about the arts, with experience of different roles in the collective decision-making process.

One important aspect of appreciating the world is teaching students to go beyond passively looking at what our societies deem beautiful and to train them to make and perform art pieces. Making is indeed an essential way for students to learn and understand how different art forms work and appreciate their elements, composition, complexity and forms of expression. It is by trying to compose music (or perhaps playing a lot) that one realises that repetition is a key ingredient of music. Another approach could be more academic, mainly through the "critique" of art pieces, the description and observation of nature and study of the philosophy and sociology of "aesthetics" as an academic discipline. This is, in a way, what "discipline-based art education" in the United States attempts to do (Winner, 2022[7]). While there may be room for such approaches over a 12-year curriculum, the limited time devoted to arts education in school leads us to prioritise other dimensions. The non-academic nature of arts education is what makes it different from many other subjects, and in many ways much more authentic and engaging (when properly taught).

Despite the emphasis on arts education, many aspects of appreciating the world can be developed in non-artistic subjects. Teachers from different subjects can help students appreciate the wonders of nature (for example, when teaching geography) and its self-regulation mechanisms (when teaching biology or natural ecosystems). As mentioned above, language art teachers can also use part of their time to focus on the appreciation of the world through reading, commenting on, and writing literature and poetry and through the performance of drama.

Finally, in our digital world, appreciating the world can also be a way to develop students' digital competences, that is, the ability to effectively use some digital software and devices. As noted by Gardner (2011[1]) and Winner (2022[7]), contemporary art increasingly includes a digital dimension, be it in music, visual art, cinema or choreography. While appreciating the world should ideally involve direct observation of artwork and nature, procedural knowledge may also encompass making and recording works, such as songs or video clips. It includes accessing artwork and even nature through digital media (e.g. recordings, digital prints or virtual reality for remote natural landscapes or seascapes). While a good balance should be maintained between digital and non-digital media, appreciating the world is also a good vehicle for the development of digital competences.

Attitudes

Beyond knowledge and skills, aesthetic appreciation of the world should also help develop some positive attitudes and dispositions.

- **Openness**: Being open to different aesthetic experiences and perspectives is one attitude that appreciating the world should develop. This can come from exposure to different styles and forms of art and nature. The expressive and emotional response to the arts and to beauty will also help students to become more aware of their emotions. Finally, as people may have different opinions

about beauty, being open to listening to others' opinion is essential to "revisit" some experiences and possibly feel the "tingles" and the "Ha!".

- **Cultural and historical sensitivity**: As our judgment about beauty varies across regions and time, shaped by our values, history and traditions, so understanding and respecting the different cultural contexts of different pieces of art will develop students' cultural and historical sensitivity and help put facts, judgments and some hierarchies into perspective.
- **Disinterested engagement**: Since Immanuel Kant, beauty has sometimes been associated with disinterest, in the sense of appreciating something for its own sake, without any practical or personal benefit in mind. This disinterested engagement is an intrinsic valuation of the world and its beauties.

Values

Finally, the main value conveyed by "Appreciating the world" is the importance of thinking globally in addition to locally. One could indeed imagine an "aesthetic appreciation of the world" limited to one's own country's nature and art. This international focus may not come as a surprise for a document from an international organisation, but it also reflects a growing awareness of sharing a common planet with other human beings across the globe, and the interdependent challenges that we face, as illustrated by the UN Sustainable Development Goals.

- **International awareness and care**: Valuation of international art, nature and cultures, going beyond one's own country. It also encompasses respect for different current, geographical and historical approaches to beauty.

Assessing aesthetic appreciation in the classroom

Less effort has been put into the standardised assessment of arts education and aesthetic judgment than into some other school subjects. Arts education has always been considered less "utilitarian" and vocational than, say, language arts, mathematics or science. This may also be due to the idea that aesthetic judgment is subjective, even if beauty gives the feeling of being "universal", and thus perhaps difficult to judge meaningfully. So how would we know that an education system promoting the development of the aesthetic appreciation of the world successfully equips its students with this competence?

A first objective would be to have sound formative assessment practices and some common standards across teachers. Formative assessment is typically the most important form of assessment as it provides feedback to all students during their learning. Arts teachers in lower secondary education typically grade their students, be it in music or visual arts, based on local expectations and culture. However, these grades tend not to have much importance for students, unless they want to apply for arts schools.

The formative assessment of "appreciating the world" should be based on the knowledge and skills that students should acquire when developing this competence. If the focus remains on arts education, several systems have developed formative assessment guides for teachers based on criteria that relate more or less to those explored above. Arts teachers need to provide feedback on their students' works of art during and after the process.

Art schools have assessed their candidates for many decades; music, dance and theatre conservatories and visual arts conservatories (which are specialised in the education of these art forms) routinely assess their learners; and many competitions have provided awards based on assessment by professional artists

or professional art scholars. Perhaps a difficulty in education systems is a lack of competent arts teachers to carry out formative assessments.

Winner (2022[7]) lists several examples of formative assessment practices in the visual arts that could inspire international criteria for formative assessment, for these and other art forms:

- **The formative and summative processfolio assessment in arts (PROPEL)**: the Propel, an arts education approach based on production, perception and reflection, was applied in music, visual arts and (creative) writing. It was developed by Project Zero researchers at Harvard University. PROPEL formative and summative assessments are based on a portfolio of student work (called processfolio because it includes all the stages of production, from first drafts and ideas to final product), in order to track students' growth and development within each art project. It also includes a journal in which the student reflects on this growth, explains what they are aiming to do and what they found challenging and which enables teachers to provide feedback beyond what they could do by just reading, listening to or watching students' production. The summative assessment is based on a rubric with shared criteria for different competence dimensions. One of them speaks to the global dimension of appreciating the world: "capacity to make discriminations in works from a wide variety of genres, cultures and historical periods. (e.g. the student can see stylistic similarities and differences among African masks; and the student can see similarities and differences in the functions of art objects by coming to understand the cultural context in which they were made.)" (Winner, 1991[15]).
- **The summative Advanced Placement Studio Art program assessment**: this is a visual arts curriculum developed by the College Board in the United States that includes a summative assessment based on a portfolio of final visual art pieces evaluated by two to three teachers teaching the same curriculum (and then harmonised among the teachers).

Other education systems provide resources and standards for the formative and summative assessment of the arts by teachers, as is for example the case in New South Wales (Australia) or in New York City (United States).[3] Art teachers associations around the world usually also provide resources for assessment. A lot of different types of assessment and evaluation approaches have been tried out internationally, in music, visual arts, literature, dance, drama, etc., as reported and analysed in the section 3 of the International Handbook on the Research in Arts Education (Bresler, 2007[16]).

Standardised assessment of aesthetic appreciation

In arts education, standardised assessments are used only to establish competence at system level:

- **NAEP arts assessment**: In 1969, the National Assessment of Education Progress (NAEP) started to measure, through a nationally (and state) representative sample and a standardised assessment, the learning outcomes of US students in grades 4 and 8. While the main focus of NAEP is reading and mathematics, the arts were included in the first assessments (1970 and 1975), and then added again in 1997, 2008 and 2016 (perhaps for the last time as in 2019 the program decided to stop assessing many subjects, including the arts). NAEP measured "response" to the arts in music and visual arts, with a focus on the following constructs: observing, describing, analysing, and evaluating works of art. However, in both music and visual arts, it included a question requesting students to create their own music piece or artwork. For example, students were asked to create a self-portrait that was scored for identifying detail, compositional elements and use of a variety of provided arts materials. The assessment also included a dimension of global

knowledge of the arts, with students for example being asked to identify the continent from which a piece of music came.[4]

- **OECD CERI arts assessment**: As part of its work on fostering and assessing creativity and critical thinking in school education (Vincent-Lancrin et al., 2019[17]), the OECD has developed an international assessment for two domains of arts education (music and visual arts) for primary and secondary education students. The challenge of an international assessment when it encompasses countries that have different artistic traditions and histories is that one cannot assess the knowledge and understanding of western art or of a specific country's culture. For example, questions assuming knowledge of (western) music notation, as is the case in the NAEP music assessment, were not deemed appropriate in this context. The approach taken as part of this work was to assess the perception of key elements of visual arts and music, the vocabulary about these elements, the intended expression of the work and general knowledge about how these art genres function. Students were asked to listen to two different pieces of music from different countries (contemporary music [Ligeti and Reich], Brazilian pop music, Arabic traditional music) and to comment on two images of visual arts (a sculpture, a sketched drawing and a painting [Douanier Rousseau]). The assessments were piloted during the project and the questions improved (or removed) and it appeared that the test was enjoyable to the children who took it. Both assessments aligned with the idea of appreciating the world rather than only one's country's culture, or at least to be able to transfer one's knowledge and skills to less familiar contexts.

These two examples answer possible concerns that Education for human flourishing learning outcomes could not be measured for progress and improvement purposes: in the case of "Appreciating the world", they certainly could.

Whether developing a standardised assessment would be useful is a different question. It would certainly signal the importance given to the competence (if others are assessed). But perhaps standardised assessments could simply be used to supplement information extracted from classroom formative assessment. In a system in which the aesthetic appreciation of the world were consistently assessed by teachers, with similar standards and some evidence (artefacts) of learning systematically collected through a portfolio, a standardised assessment would not really be necessary. One could imagine ways to use those formative assessments to provide a national/jurisdictional "report card" on how students are doing relative to this competence. For example, one could collect randomly a number of teacher-based assessments and student portfolios and use them as a basis to re-assess the level of knowledge and skills of students for the different dimensions of "appreciating the world".

Conclusion

Appreciating the world is a competence that allows children to have a positive attitude towards the beauty of nature and cultural artefacts, locally and globally. It also helps them to relate to beauty and the world in ways that other school experiences do not allow, because what we find beautiful leads us to connect with others, to make better sense of ourselves and to act. Its nurture is mainly based on arts education and literature, but the hope is that it will transfer to other types of aesthetic experience, and that pupils will be able to identify and discriminate between different works of art from different cultures, historical periods, and different sub-genres within an art form.

This should contribute to their personal wellbeing and flourishing by enabling them to develop the use of all their senses and be attentive to the sensuousness of nature and art. This chapter presents the knowledge, skills, attitudes, and values that the aesthetic appreciation should develop, thereby providing a framework for developing a curriculum. Most of the progress will come from a competent and well-trained

teaching workforce able to guide students in showing their appreciation of the world through creating and discussing beauty.

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Notes

[1] See Arts National Report Card (NCES, 2016[18]).

[2] See section 5 of Bresler (2007[16]) for examples.

[3] See https://education.nsw.gov.au/teaching-and-learning/curriculum/creative-arts and https://www.nysed.gov/sites/default/files/programs/curriculum-instruction/arts-assessment-think-document.pdf.

[4] For more details, see https://www.nationsreportcard.gov/arts_2016/#/.

2.4. Understanding the world

Between 2010 and 2015, the incidence of depression among US teenagers more than doubled. Reporting similar trends across 37 countries, Jonathan Haidt argues that Generation Z, born aften 1995, has been inadequately protected from the virtual world and excessively protected from the real world, causing pronounced decline in teenage mental health (Haidt, 2024[1]).

In the US in 2022, Generation Z, by then young adults of 18-25, reported lower well-being, on all dimensions, than any other age group (Weissbourd et al., 2023[2]). A lack of meaning, purpose and direction was identified as the primary driver. 45% of young adult respondents said that "things seem to be falling apart", citing gun violence, climate change and the incompetence or corruption of political leaders.

A primary reason for the loss of meaning young people say they feel in their lives may be a relative collapse in traditional moorings. They are less likely than their parents and grandparents to find a stable and secure identity in geographical community, religious faith and political affiliation.

This may in turn be attributed, at least in part, to the confusion of competing worldviews that young people now encounter in their lives: the range of explanatory perspectives and motivating beliefs that characterise news, information and entertainment in the age of social media. Democracy, education and science – the ideas, values and practices that anchored the 20th Century - no longer command such loyalty.

By developing a competency in understanding and respecting competing worldviews, and synthesising them into an integrated outlook, young people could both acknowledge prior moorings and develop new and stronger moorings for the future. The aim would be to recover an important dimension of their well-being but also to build an understanding sufficiently comprehensive and robust to allow them to co-create solutions to the challenges of the next 100 years. An ability to understand, appreciate and synthesise different worldviews could in addition guard against the frustration that leads to authoritarian ideologies

and societal instability, and build wisdom, moral courage and determination. It could also entrench the processes and tools of scientific enquiry. Science is intrinsic to multiple worldviews and could be the centrepiece of a new synthesis.

What follows is a preliminary sketch of such a competency: Understanding the World. It draws on three major sources:

- The OECD's Global Competence assessment, developed for PISA 2018 (OECD, 2018[3]).
- The analysis of competing worldviews in Meta Modernity: Meaning and Hope in a Complex World (Andersen, 2019[4])
- Emerging proposals for buttressing public understanding of science (exemplified in Third Millennium Thinking) (Perlmutter, S. et al., 2024[5])

Competency definition

Understanding the World borrows on foundational work on Global Competence (OECD, 2018[3]). The framework's preface provides the underlying proposition:

> *Twenty-first century students live in an interconnected, diverse and rapidly changing world. Emerging economic, digital, cultural, demographic and environmental forces are shaping young people's lives around the planet and increasing their intercultural encounters on a daily basis. This complex environment presents both an opportunity and a challenge. Young people today must not only learn to participate in a more interconnected world but also appreciate and benefit from cultural differences. Developing a global and intercultural outlook is a process – a lifelong process – that education can shape.*

The framework goes on to define globally competent individuals as people who can (1) examine global and intercultural issues; (2) understand and appreciate different perspectives and worldviews; (3) interact successfully with others; and (4) take responsible action toward sustainability and collective well-being.

The Global Competence and Understanding the World propositions are related but not the same. Both recognise that unprecedented future challenges require effective collective action. Both suggest that collective action is dependent on a grasp of global and intercultural issues and the ability to understand, appreciate and communicate with people from other cultures and perspectives. To this extent, both are pragmatic competencies, in the sense that they seek to equip young people to solve a set of shared problems. But Understanding the World goes deeper and further. It proposes that many young people have lost sight of their own cultures and perspectives; that it will be important that they understand both their own and other cultures and perspectives; that it will be through synthesising those cultures and perspectives that they equip themselves to solve shared problems; and that in doing so they will find new sources of meaning and purpose.

This difference between the two propositions in turn drives a difference of definition. Individuals who understand the world (1) examine global and intercultural issues; and (2) understand, appreciate and synthesise different perspectives and worldviews.

The elements of the Global Competence definition omitted here (interacting with others and taking action) are of course vitally important. But they are less to do with understanding than acting. They will be picked up in a further competency, to be discussed below: Acting in the World.

In *Meta Modernity: Meaning and Hope in a Complex World*, Lene Rachel Andersen (2019[4]) distinguishes between four worldviews, all deriving from a historical epoch while remaining prevalent and relevant in the contemporary world. The indigenous view emphasises tribe, myth, order and the integration of human beings and nature. The pre-modern view subordinates the individual to religious and community norms. The modern view balances the needs of individuals and society: within a framework built on science, democracy and education, it provides the national and international institutions that continue to shape our

world. And the post-modern view exposes, without resolution, the arbitrariness and hidden structures of those institutions.

> *Meta modernity is integrating the emancipatory elements of indigenous, pre-modern, modern and post-modern cultural codes into one connected whole; a multi-layered cultural code with a complexity that matches the complexity of the world…. On their own, none of the codes is sufficiently complex to handle our current and future reality. Indigenous code can only regulate small, intimate groups, pre-modernity does not offer individual freedom and democracy, modernity is reductionist and cannot see its own shortcomings and post-modernity leaves society with identity politics based on subjective sentiments.*

A cultural code is represented as the system of values, symbols and meanings that are relevant to members of a particular society in order to survive and thrive. Cultural codes entrench a collective imaginary: a shared idea of what the society should be like. That idea is itself derived from a shared epistemology: the knowledge and assumptions that help a society navigate the world and interpret what its members see and hear. Andersen argues that contemporary societies, in transition from the industrial era, are finding that their epistemologies, imaginaries and cultural codes are inadequate to the future.

The challenge of synthesising the codes to create a meta modern code is complex and demanding. Meta modernity does not consist of a once-and-for-all reconciliation, in which parts of different codes are integrated into one stable, unitary code for the future. It involves the ability to understand which codes are most likely, singly and in combination, to shed light and offer insight in particular situations. Andersen pictures an archipelago, with islands of understanding linked by bridges, each sufficiently robust to let people travel from one to the other.

The relationship between the modern and post-modern worldviews is ambiguous. Many of our existing values, institutions and processes are those of the modern epoch. They have been questioned and profoundly disturbed by post-modernity but not replaced. The challenge facing us today is to evolve, renew and add to them, in a way that rebuilds trust.

Central to those values, institutions and processes is science. In the eighteenth, nineteenth and twentieth centuries, science both gave an explanatory framework and propelled progress. In recent times, for different reasons, it has often been viewed with suspicion and disillusionment. Perlmutter, Campbell and MacCoun argue that scientific perspectives and practices still offer a definitive apparatus for surviving and thriving (Third Millennium Thinking, 2024). But they recognise that science should be better explained and understood; that expert practitioners should acknowledge their limitations; and that everyone should play their part in collective decision-making that makes use of scientific analysis but draws on other sources of information and insight.

The scientific tradition values curiosity, scepticism and humility. It takes its authority “from relentless self-questioning”, underpinned by thinking tools: “habits of mind, rubrics, approaches, procedures, standards, ideas, principles and stances”. But if these tools are to alleviate poverty, support increasing populations, identify new vaccines and shape the global environment there must first be an be adjustment. Citizens should understand that science is hypothesis-based, grounded in probabilistic thinking and subject to statistical and systematic uncertainty. Scientists should restrict themselves to bringing the most accurate information they can to broader decision-making processes. Their contribution should be weighed in the balance with individual and societal values; and the responsibility for decision-making should be held by citizens collectively, taking special account of those most directly affected.

In summary, it is proposed that young people should be competent in examining global and intercultural issues through the lens of four major worldviews, to prepare them to solve those issues and so make meaning in their lives. Scientific perspectives and practices, adjusted and qualified to support collective understanding and decision-making, should be central to shaping a synthesis of worldviews.

Competency components

Knowledge

Understanding the World requires knowledge of global issues and intercultural issues that arise from the interaction of people from different backgrounds.

Global issues are those that affect all individuals, regardless of their nation or social group. They can be taught through specific domains: socio-economic development and interdependence; environmental sustainability; and international institutions, conflicts and human rights.

The domain of socio-economic development and interdependence refers to the study of development patterns in different regions of the world, with a focus on the links between societies and economies in the context of international migration, transnational production, global brands and technologies. The domain of environmental sustainability addresses the systems and policies surrounding the demand for and use of natural resources. The third domain focuses on formal and informal institutions that support peaceful relationships between people. Acquiring knowledge in this domain helps young people to develop values such as peace, non-discrimination, equality, justice, non-violence, tolerance and respect.

Whereas global issues emerge when ecological and socio-economic interests cross borders, intercultural issues arise from the interaction of people with different cultural backgrounds, as each interprets the others' ways of thinking, believing, feeling and acting. Understanding the World proposes that the frame for considering intercultural issues should be the four worldviews: the essential ideas and values that characterise the indigenous, pre-modern, modern and post-modern perspectives. These are characterised as follows by Andersen (2019[4]):

Table 2.1. Essential ideas and values that characterise the indigenous, pre-modern, modern and post-modern perspectives

Indigenous	Pre-modern	Modern	Post-modern
Egalitarian	Patriarchal	Egalitarian	Ad hoc
Order v chaos	Hierarchical	Democratic	Chaotic
Magical	Religious	Secular	Feeling
Pragmatic	Dogmatic	Doubting	Irony
Belief	Faith	Science	Information
Myth	Truth	Facts	Identity & feelings
Tribe/clan	Town/city	Nation	No boundaries
Given	Unified	Unifying	Deconstruction
Circular understanding	Linear understanding	Newtonian cause and effect understanding	Relativising understanding
Spirits uphold order	God (s) interfere (s) with the world and human life	Physical world only	Individual reality

Source: Anderson, (2019[4]), *MetaModernity: Meaning and hope in a complex world*.

A grasp of the role of science, both its possibilities and limitations, is a core dimension of the knowledge required for Understanding the World. Andersen locates science squarely within the Modern worldview. But in Third Millennium Thinking, which emphasises collective responsibility for addressing challenges with a scientific dimension, Perlmutter et al position science as straddling the Modern and Post-Modern worldviews. They offer a new perspective on science, built around a series of shifts:

- From factual thinking to probabilistic thinking
- From "reductionism is all" to a multilevel, nuanced view that includes emergent phenomena
- From masterstroke solutions to iterative solutions

- From technocratic to deliberative decision-making
- From zero-sum-game trade-offs to win-win solutions

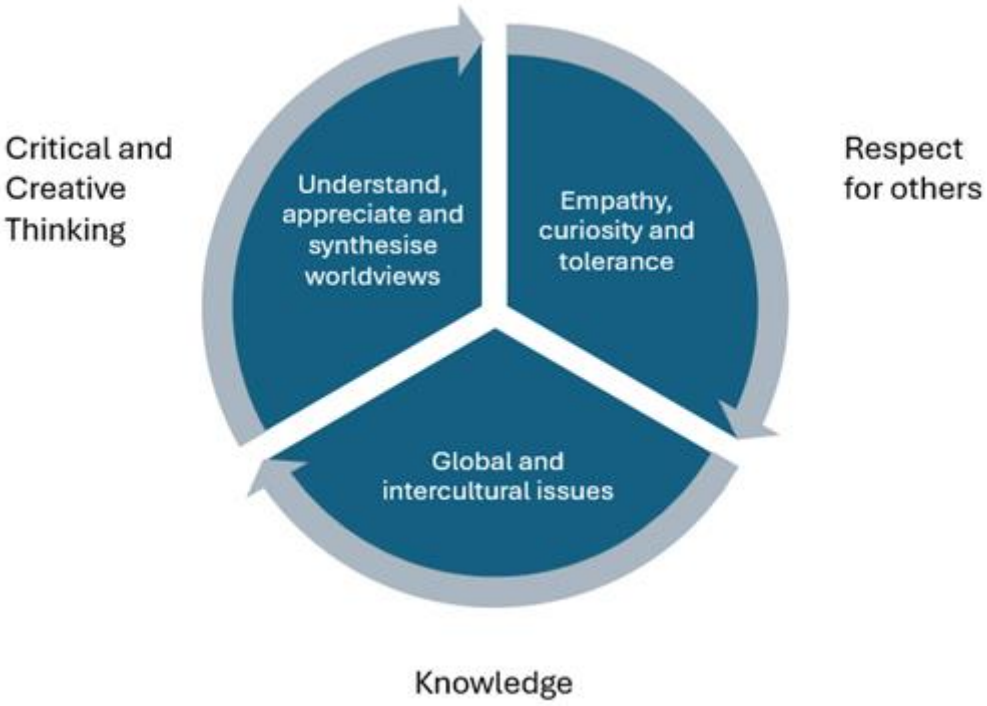
Skills

The Understanding the World competency conceptualises the knowledge base analysed above interacting with both cognitive and social and emotional skills.

The cognitive skills enable students to understand, appreciate and synthesise competing worldviews. Reading literacy equips them to understand and appreciate through processes of critical thinking. The ability to synthesise draws on processes associated with creative thinking, including the ability to identify diverse approaches to specific issues and problems and to combine them in new ways.

The key social and emotional skills are empathy, curiosity and tolerance: sensing that others may hold different views and observe different values, wishing to understand why they do so and refraining from judgement over them. Together these skills constitute respect for other people and perspectives.

Figure 2.9. Competency model



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2.5. Acting in the world

Acting in the world consists of the ability to develop and deploy agency. Of the Education for human flourishing competencies, Acting in the world is first among equals. It is enabled by Adaptive problem-solving and Ethical competence. It stands at the apex of the meaning-making competencies, complemented and supported by Understanding the world and Appreciating the world. And it serves, above all, to equip young people for the 21st Century's vital task: to contribute to remaking our societies, economies and organisations.

The Neo-Aristotelian account of Education for human flourishing gives weight to both action and contemplation. Acting in the world, Adaptive problem-solving and Ethical competence are related to action. Understanding the world and Appreciating the world are related to contemplation.

Byung Chul Han (2024[1]) argues that today more than ever people need to act less and contemplate more – to resist the modern urge for activity and communication. Following Heidegger, he sees being as more important than doing. Otto Scharmer establishes a bridge between the two (2018[2]). He suggests that only through deep awareness of system and self (being) is it possible to develop intention and initiate action (doing). But this is action as the realisation of purpose, not busyness for its own sake.

Toward a definition of Acting in the world

William Damon (2008[3]) noted a widespread inability among young people to locate a sense of purpose.

> *Their delay is characterised more by indecision than by motivated reflection, more by confusion than the pursuit of clear goals, more by ambivalence than by determination…what is too often missing – not altogether absent but evident only in a minority of today's youth – is the kind of wholehearted dedication to an activity or interest that stems from a serious purpose, a purpose that can give meaning and direction in life.*

Damon argued that for many young people, school is a place not for finding purpose but for learning and memorising a body of knowledge – and one bearing little relation to future choices, goals and activities. To this extent, education has been more about knowing than doing.

In recent years, however, and against the backdrop painted by Damon, student agency has become a central feature of education theory and practice. Agency deploys knowledge in order to facilitate action, and in so doing, it restores purpose.

The OECD Education and Skills 2030 initiative also highlights the concept of student agency. In Student Agency for 2030 (2019[4]), students with agency are said to have the will to positively influence their own lives and the world around them.

> *Student agency relates to the development of an identity and a sense of belonging. When students develop agency they rely on motivation, hope, self-efficacy and growth mindset (the understanding that ability and intelligence can be developed) to navigate toward well-being. This enables them to act with a sense of purpose, which guides them to flourish and thrive in society.*

Student agency implies a different education landscape. Teachers and learners work together on the co-construction of learning, adjusting traditional models of instruction and evaluation. Formal learning in the classroom sits alongside informal and non-formal learning. Agency in education mirrors the exercise of agency in life. Both are relational, involving interactions with peers, teachers, family and the community. "Co-agency", an educational term for the teacher-student relationship, points in turn to "collective agency", where individuals act together for a community, a movement or society as a whole.

Leadbeater builds on and sharpens this account. He argues that young people exercise agency not only by identifying purpose but by developing intent and acting on it. A real sense of purpose, he says, is grounded in identity (who we are; what matters to us), intent (what change we want to bring about) and action (how we can make this change demonstrable) (2022[5]). Young people develop agency through the range of curricular and extra-curricular opportunities. They might design a new solution to support people in close or far-away communities, participate in a self-organised music group that plays publicly from time to time, join an astronomy club or develop a start-up company. In the same way, adults exercise agency across many human activities: in work of course, but also through passions and interests (performing arts, sport, volunteering, political engagement) and indeed in caring for their children. In a sense, the student practices the acquisition of purpose and intent in order to act in the world over a lifetime.

Toward a framework

How does Acting in the world mobilise the other Education for human flourishing competencies? First, the ability to see global and inter-cultural issues through the lens of different worldviews, combining different insights to create a single, multi-faceted view, helps the student to identify purpose and intention and choose activities to which they can potentially contribute. Second, the student who reflects deeply on what is beautiful in the arts and the natural world, placing self in a spiritual setting, brings a deeper perspective to their choice of purpose, intent and activities. Third, Acting in the World puts adaptive problem-solving skills to work. Students are challenged to design solutions to real-world problems in their chosen area of activity, using the knowledge and skills they have acquired in solving previous problems and transferring them to create solutions to new problems. Finally, Acting in the World engages ethical competence. One's choices should reflect an understanding of their consequences. They should advance the needs and interests of others, not only in principle but in practical approaches to co-designing fair and sustainable solutions.

Depending on the student's purpose, intent and activities, Acting in the world draws on the factual, procedural and epistemic knowledge associated with the other competencies, across STEM, humanities, social science and the arts. The student will typically build on relevant knowledge, learning outside school, autonomously and over time.

Equally important are the social and emotional skills intrinsic to the other competencies. The skills related to task performance and emotional regulation (adaptive problem-solving) and to open-mindedness (ethical reasoning, understanding the world and appreciating the world) are all relevant to the formulation of meaningful direction and the successful pursuit of related activities.

Four specific skills seem especially important in supporting an ability to act in the world.

- Creativity: seeking out different types of approach to achieving one's goals and interests
- Collaboration. In most cases though not all, the student will identify shared purpose and intent and work with others on consequent activities, mobilising trust and co-operation

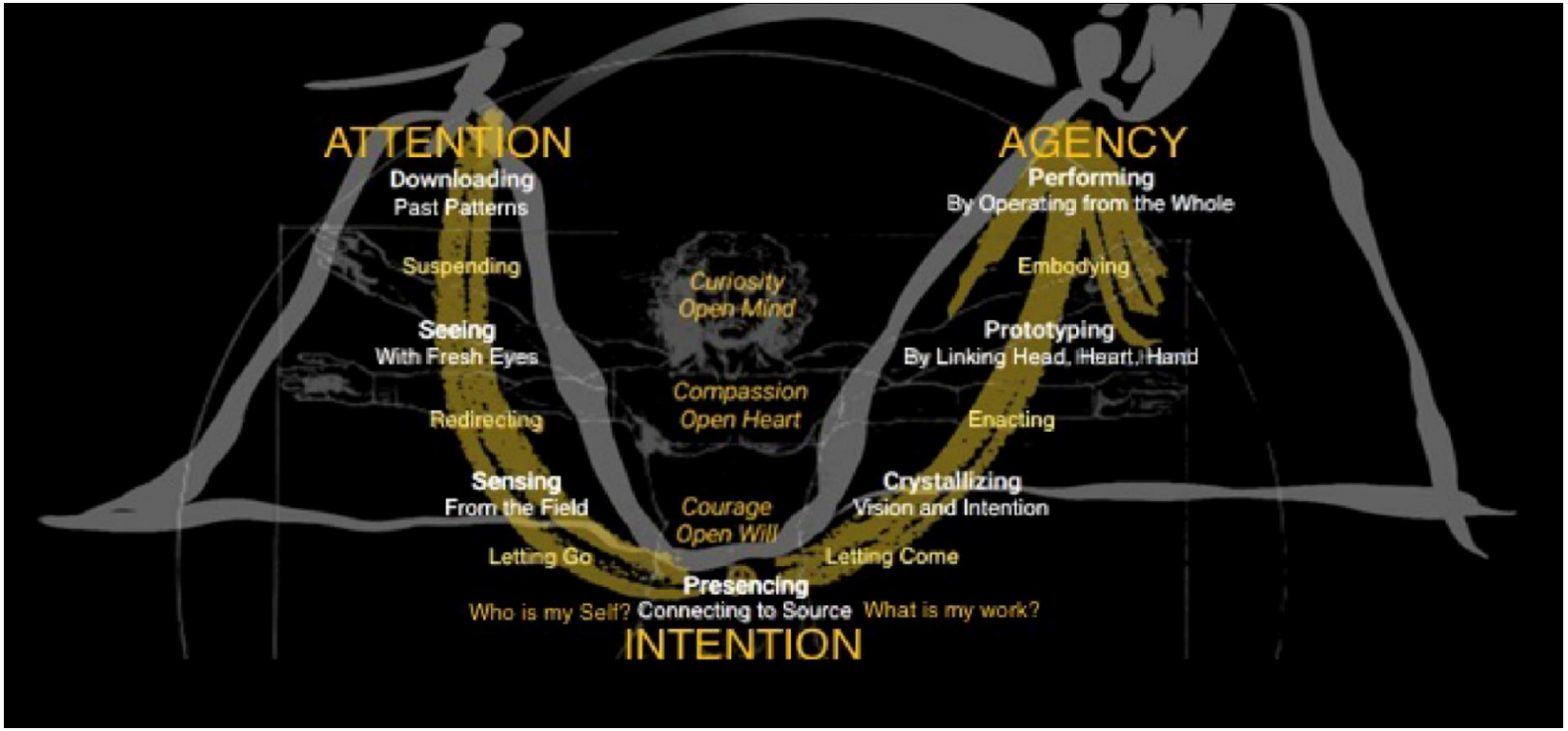
- Self-efficacy: grit, resilience and belief that one can achieve one's goals, even in the face of setbacks, in areas of natural strength but also initial weakness.
- Self-actualisation: the drive and insight to shape a personal narrative that patterns and directs one's life.

Acting in the World thrives on a positive attitude to learning itself. Students should be willing to learn not only in school but in informal and non-formal settings, autonomously and over time. They should expect to learn independently to achieve their current project and be confident of devising an appropriate learning programme for their next project. Acting in the world encompasses the belief that purpose, intent and activity are inherently valuable in enabling the individual to express personal goals and talents in ways that contribute to others.

Acting in the world: from learning to leadership

The High Performing Systems for Tomorrow initiative has worked closely with Otto Scharmer (2018[2]), both as an expert adviser on the Education for human flourishing framework and the author of a leadership development programme for participating jurisdictions and organisations. "Theory U" underpins both these contributions. Conceptualised as a process for enabling leaders to change organisations and systems through personal transformation, it carries strong resonances for a generation of young people entrusted with the design and stewardship of tomorrow's societal, economic and organisational models.

Figure 2.10. Theory U



Source: C. Otto Scharmer and Katrin Kaufer, (2025[6]), *Presencing*, Colour Plate 2, Theory U II.

Theory U complements and enriches the Education for human flourishing framework, especially the foundational arguments and the competencies. It offers a powerful perspective on what it is to act in the world, for leaders and learners.

The challenges that face our societies, and therefore the next generation, are analysed in terms of three divides: one between the self and nature, one between the self and others and one between the self and the self. An Open heart (curiosity), an Open Heart (compassion) and an Open Will (courage) are seen as key to closing these divides, in order to act in the world.

Exercising intent and agency are presented as central concepts. A prior, connected concept is attention, defined as the ability to see and sense the environment (which might be an organisation or a system) and oneself as part of the environment.

Theory U invites people to take a journey, in the shape of a U, through a series of processes: downloading past patterns, seeing with fresh eyes and sensing from the field (attention); presencing and crystallising vision and (intent); and prototyping by linking head, heart and hand and performing by operating from the whole (agency). The journey is designed to link personal change to change in the world.

Finally, the theory proposes seven personal practices, one for each process: becoming aware, listening, dialogue, presencing, co-imagination, co-creation and co-governance. Together, the practices strengthen the quality of awareness and relationships.

The relevance of Theory U for Acting in the world, as the fifth and overarching competency in the Education for human flourishing framework, is compelling. It links personal development to enacting external change. It suggests a journey through awareness and intent to specific activities. And it offers personal and collective practices that underpin and engage the Education for human flourishing competencies, from Understanding the world, through Appreciating the world, on to Adaptive problem-solving, Ethical competence and Acting in the world itself.

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3 Education for human flourishing architecture

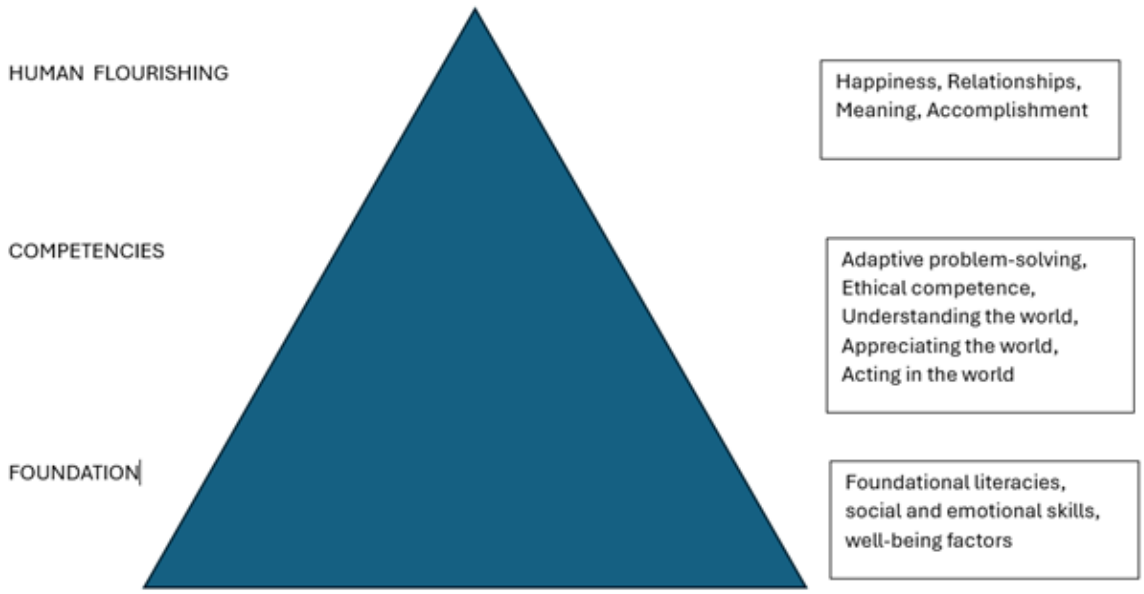
Introduction

Central to the Education for human flourishing framework is the set of five competencies designed to support young people in leading a flourishing life. We have analysed what each competency consists of. The next step is to consider how they fit into a broader learning framework.

The purpose of a broader framework is not only to establish overall coherence. It is also to lay the ground for the selection of metrics, providing an approach to identifying student abilities in the competencies and the extent to which students are flourishing, through mobilising the competencies.

The proposed Education for human flourishing architecture consists of three parts: a foundation, built by integrating literacies, social and emotional skills and well-being domains; the five Education for human flourishing competencies; and the four dimensions of human flourishing to which the competencies contribute:

Figure 3.1. Education for human flourishing metrics framework



The Education for human flourishing foundation

Every young person should have the opportunity to develop a set of core literacies and skills, and to do so in family, community and educational settings that are conducive to well-being. These literacies and skills may be called foundational in two senses. First, they provide a necessary toolkit for life and work. Second, they scaffold specific Education for human flourishing competencies, which draw on individual literacies and skills.

The conceptual relationship between literacies, social and emotional skills and student well-being domains is emerging through different projects, in the OECD and elsewhere. It is increasingly apparent that the literacies themselves draw not only on knowledge and cognitive skills but social and emotional skills too; and that the literacies together constitute a major student well-being domain. Research also suggests that social and emotional skills play a significant part in supporting other student well-being domains, including psychological well-being.

We now look in greater detail at how the foundation is constituted, referring throughout to recent OECD analyses. We begin with social and emotional skills; relate them to student well-being; and then examine the relationship between social and emotional skills and the PISA literacies.

The latest OECD Survey on Social and Emotional Skills (2024[1]) measured the skills of 10- and 15-year-olds in five categories:

Table 3.1. OECD Social and Emotional Skills Survey, categories

Task performance	Persistence, responsibility, self-control and achievement motivation
Emotional regulation	Stress resistance, emotional control and optimism
Engaging with others	Assertiveness, sociability and energy
Open-mindedness	Curiosity, creativity and tolerance
Collaboration	Empathy and trust

The SSES found disparities in social and emotional skills by age, gender and social background. It also found a decline in most of the skills by comparison with the first time the survey was run in 2019 (OECD[2]), in the two sites participating in both cycles.

A recent study uses PISA data to establish links between social and emotional skills and student well-being (Cignetti and Piacentini, 2024[3]). The study proposes nine well-being domains: academic performance; psychological well-being; agency and engagement; resilience; engagement with school; social relationships; study/life balance; material and cultural well-being; and openness to diversity.

In many of the nine well-being domains, the proposed indicators reflect the dimensions of specific social and emotional skills. For example, the indicators for psychological well-being include emotional control, life satisfaction and sense of purpose. For resilience, they include stress resistance and belief in self. For engagement in school, they include perseverance and motivation to do well.

Increasingly over the last ten years, the PISA frameworks for the assessment of reading, mathematics and science have also given a prominent place to social and emotional skills.

Reading

The most recent PISA analysis of Reading was developed for the 2018 cycle. Here, the definition adopted for reading literacy is:

> *"Understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, to develop one's knowledge and potential and to participate in society."*

The central dimension of reading literacy is presented as text processing. This entails the ability to locate information; to understand, by representing literal meaning and integrating and generating inferences; and to evaluate and reflect, by assessing quality and credibility, reflecting on content and form and detecting and handling conflict. Significant weight is also placed on task management, a major domain within the social and emotional skills framework. This is said to cover setting goals and plans; and monitoring and regulating. The fluent reader, therefore, is someone who is adept in both text processing and task management.

Mathematics

Mathematics literacy was analysed for PISA 2022 (OECD, 2023[4]), using the following definition:

> *"An individual's capacity to reason mathematically and to formulate, employ and interpret mathematics to solve problems in a variety of real-world contexts. It includes concludes concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to know the role that mathematics plays in the world and to make the well-founded judgements and decisions needed by constructive, engaged and reflective 21st Century citizens".*

A number of social and emotional skills are said to be related to successful mathematical reasoning, including persistence. creativity and self-direction. Two "compound" skills, in the sense that they have a social/emotional component, are also cited: critical thinking and self-reflection.

Science

The draft PISA 2025 science framework (OECD, 2023[5]) represents the most mature conceptualisation do far of how knowledge, cognitive skills and social and emotional skills interact, in a broader context that takes in attitudes and values. The framework defines

"the competencies that are developed by science education. These are perceived to be a key educational outcome for students, in order to engage with science-related issues, with the ideas of science, and to use them for informed decision-making".

In personal, local/national and global contexts, individuals are required to explain phenomena scientifically; not only construct and evaluate designs for scientific enquiry but also interpret scientific data and evidence critically; and research, evaluate and use scientific information for decision-making and action.

Supporting these abilities are factual, procedural and epistemic knowledge and "scientific identity". This second concept is said to cover valuing scientific perspectives and approaches to enquiry; environmental awareness, concern and agency; and the affective elements of science identity.

The draft PISA framework offers a distinct but related analysis of environmental science competencies. Knowledge and science identity are again said to be important underpinnings. The competencies themselves are conceived as entailing specific attitudes and values. For example, the third requires the individual to "demonstrate respect for diverse perspectives, and hope, in seeking solutions to socio-ecological crises".

The Education for human flourishing competencies

The Education for human flourishing project has identified and analysed five central student competencies: adaptive problem-solving, ethical competence, understanding the world, appreciating the world and acting in the world.

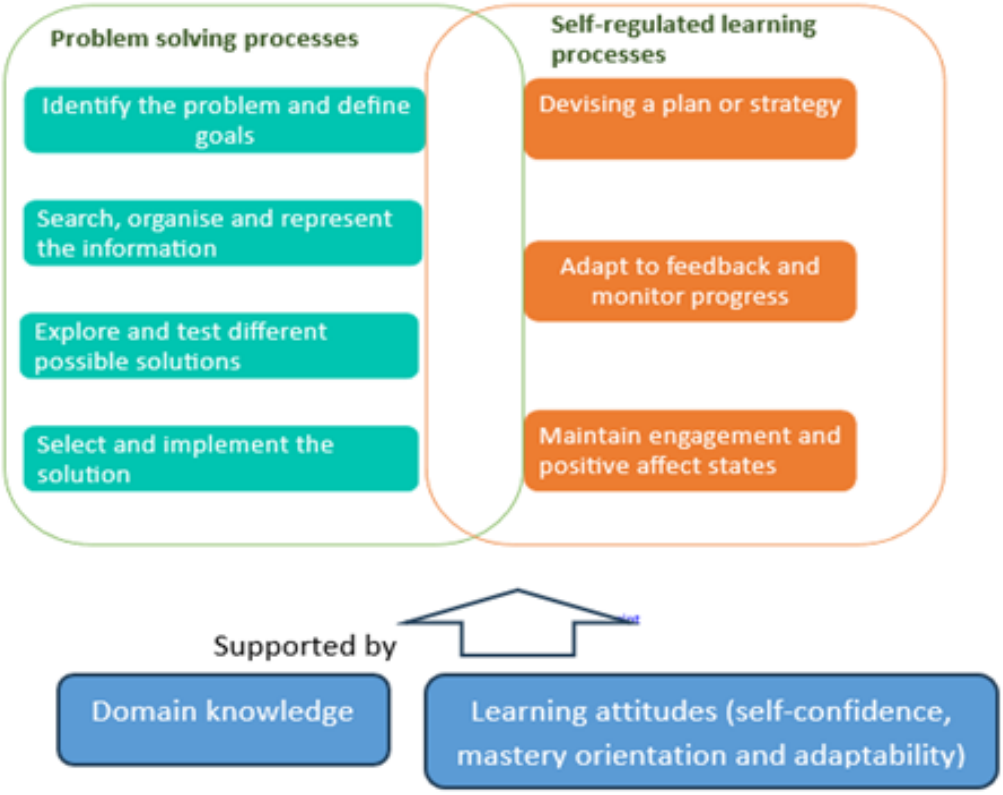
How does each competency relate to the cognitive, social and emotional skills and the well-being domains that constitute the Education for human flourishing foundation?

Adaptive problem-solving

Proficiency in adaptive problem-solving means being able to make good choices in a variety of real-life situations where outcomes are uncertain and where routine solutions are unlikely to work. At the end of their school life, students will not have sufficient knowledge schemas or procedures to address many of the situations they will encounter in real life. However, if their schools have prepared them well for learning autonomously, then students will be able to navigate most of these situations by exploring the problem space, planning and implementing actions, monitoring the consequences of their choices and adapting to feedback.

The competency is conceptualised as a combination of problem-solving processes and self-regulated learning processes, supported by domain knowledge and learning attitudes.

Figure 3.2. Adaptive problem-solving competency model



The primary sphere in which adaptive problem-solving takes place is Science, Technology, Engineering and Mathematics. In terms of the Education for human flourishing foundation, analysed above, the relevant literacies are Science and Mathematics.

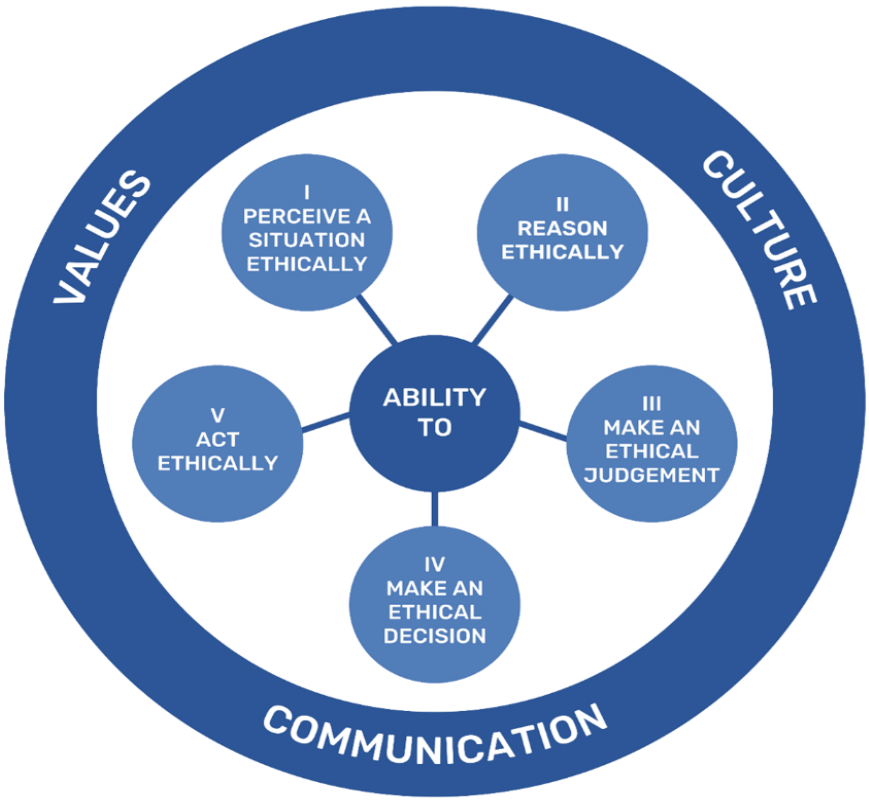
The core knowledge that supports the competency encompasses the factual, procedural and epistemic knowledge of mathematics and science. The problem-solving processes integral to the competency build on prior expertise in solving mathematical problems (formulation, employment and interpretation) and conducting scientific enquiries (construction and evaluation of enquiry design; interpretation of data and evidence) and are underpinned by the divergent thinking associated with creativity, a key social and emotional skill within the open mindedness domain. The self-regulated learning processes and the learning attitudes related to the competency draw on two further social and emotional domains (task performance and emotional regulation) and the “compound” self-efficacy.

Ethical competence

Ethical competence equips individuals to address modern ethical challenges, including technological, environmental, and social challenges. serving as the foundation for consistent and principled actions across personal, professional, and societal contexts. It is integral to problem-solving and engages the capacities to understand, appreciate and act in the world.

Ethical competence involves the development of five sub-competences: the ability to perceive a situation ethically, the ability ot reason ethically, the ability to make ethical judgements, the ability to make ethical decisions and the ability ot act ethically.

Figure 3.3. Model for ethical competence



Ethical competence is an important dimension of the Sciences, the Social Sciences and the Humanities, within and across disciplines.

Relevant literacies are therefore Reading (requiring students to evaluate and reflect on what they read, by assessing quality and credibility, reflecting on content and form; and detecting and handling conflict) and Science (requiring students to research, evaluate and use scientific information for decision-making and action; and to display environmental awareness, concern and agency.)

Important social and emotional skills are curiosity, tolerance, empathy and trust.

Appreciating the world

Aesthetic appreciation relates to human enjoyment of nature and the arts. Until the turn of the 20th Century, most people's engagement with nature and the arts was limited by location: the area in which they lived. In the modern era, opportunity has been expanded by travel and technologies. The sphere for aesthetic appreciation has become global.

Gardner argues that beauty is a property of experiences, and that aesthetic appreciation inheres in experiencing and absorbing experiences that are personally interesting, memorable and worth revisiting.

The EHF framework for Appreciating the world is more tightly drawn. It is defined as "the ability to observe, carefully analyse, understand, feel and value the beauty found in nature and in various human creative forms, found across different cultures and world regions, based on knowledge and practice"

Aesthetic appreciation should not just come by passively looking at what is deemed beautiful, but through making and performing art pieces.

It follows that whereas the other Education for human flourishing competencies draw significantly, though in different ways, on scientific, mathematical and reading literacies, Appreciating the world nurtures different and specific cognitive knowledge and skills, in particular knowledge of various categories and forms of the performing and fine arts and the knowledge and skills acquired by performing or making art. In this sphere, critical thinking implies the ability to articulate a reasoned judgment about the beauty of a piece of art or a natural scene after carefully observing and analysing it in terms of composition and expression; while creativity implies the ability to make novel pieces of art, applying one's own ideas to meet pre-set constraints or objectives, making connections with one's knowledge and experience of the world.

Appreciating the world builds on the EHF foundation by deploying three specific social and emotional skills.

Communication: the ability to describe different types of art-work, natural and manmade beauty, and the feelings and emotions they induce with appropriate vocabulary, using aesthetic criteria and reasoning, be it through the arts or as an enrichment of other forms of communication

Collaboration: the ability to contribute to a collective art performance, to the creation of a collective piece of art or communication about the arts.

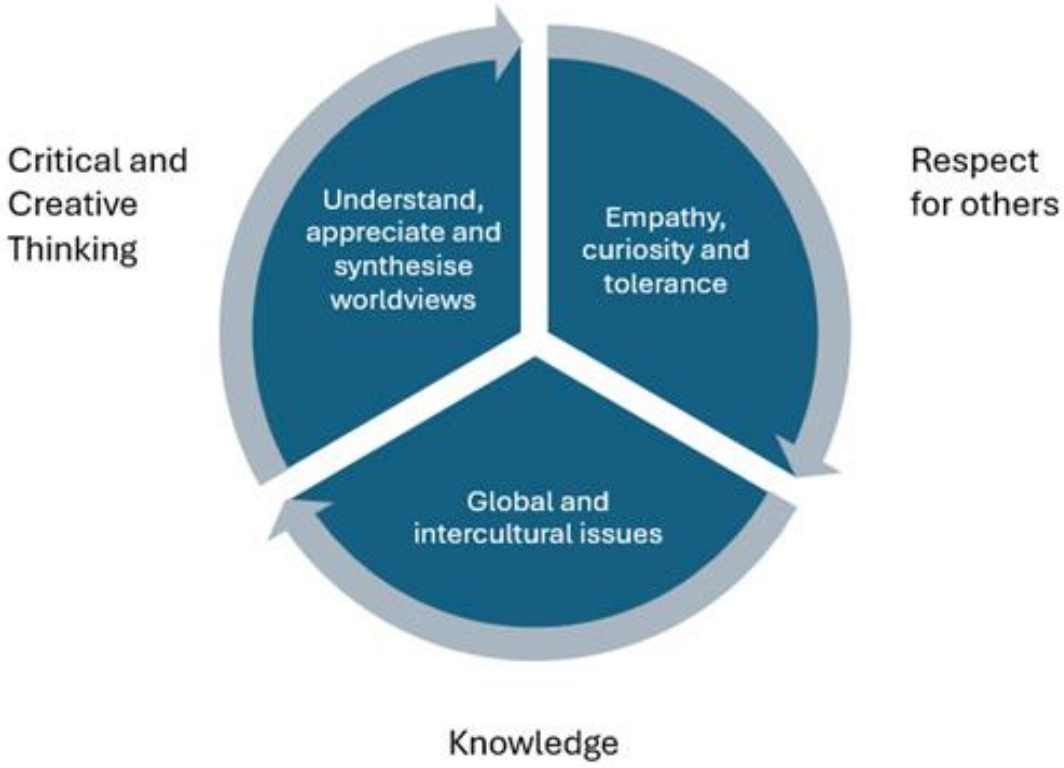
Openness: Being open to different aesthetic experiences and perspectives, through exposure to different styles and forms in art and nature.

Finally, the main value conveyed by Appreciating the world is the importance of perceiving, thinking and responding to art and nature globally, from every community and country.

Understanding the world

Proficiency in understanding the world is defined as developing a perspective on global and intercultural issues by understanding, appreciating and synthesising different worldviews. It encompasses knowledge of global and intercultural issues, critical and creative thinking skills and respect for others.

Figure 3.4. Understanding the world competency model



Understanding the world draws on interdisciplinary knowledge and skills across a wide range of fields, including Science, Mathematics, the Social Sciences and the Humanities. Particularly important here is to understand how these different fields are conceptualised by different cultures and peoples, and how these conceptualisations have evolved over time.

Two literacies are particularly relevant. Scientific literacy is increasingly seen as an interplay between knowledge, skills and identity, where identity requires not only positive attitudes toward science but also insight into how others perceive science. Reading literacy provides the apparatus for the understanding and appreciation components of critical thinking. The synthesis component draws on an aspect of critical thinking: the ability to identify diverse approaches to issues and to combine them in innovative ways.

Understanding the world mobilises those social and emotional skills that support respect for others: empathy and curiosity (from the Collaboration domain) and tolerance (from the Open-mindedness domain.)

Acting in the world

At a time when many young people seem to lack purpose, student agency has become a central feature of education theory and practice. The competency Acting in the world is built around the concept of agency. It is defined as the ability to identify purpose, to develop intent and to act on it. Agency can be pursued across the range of human activities: in work of course, but also through passions and interests (performing arts, sport, volunteering, political engagement). It can also be pursued in family contexts, such as caring for one's children.

Acting in the world combines the ability to identify areas of personal interest with the willingness to contribute through personal engagement. For the student, preparing to act in the world as an adult, it could mean designing a new solution to support people in close or far-away communities, participating in

a self-organised music group, belonging to an astronomy club or developing a start-up company. It requires the capacity to integrate, combine and deepen knowledge acquired both in school and out of school; and to go on learning, autonomously, through life.

Depending on the direction that individual students take, Acting in the world may potentially deploy knowledge from all disciplines and subjects, including STEM, the social sciences, the humanities and the arts.

At the same time, Acting in the world is seen as mobilising the other four Education for human flourishing competencies. The abilities to understand global and inter-cultural issues through the lens of different worldviews, to sense the relationship between self and environment, to be sensitive to the consequences of one's actions for others and to transfer the skills acquired in solving previous problems to new ones all support the student in identifying purpose and intent and following through in specific activities.

For this reason, Acting in the world mobilises precisely those literacies required by the other competencies. For example, it mobilises scientific and mathematical literacy (adaptive problem-solving) and reading literacy (ethical reasoning, understanding the world).

In addition, Acting in the world draws on four prominent social and emotional skills:

- Creativity: seeking out different types of approach to achieving one's goals and interests
- Collaboration. In most cases though not all, the student will identify shared purpose and intent and work with others on consequent activities, mobilising trust and co-operation
- Self-efficacy: grit, resilience and belief that one can achieve one's goals, even in the face of setbacks, in areas of natural strength but also initial weakness.
- Self-actualisation: the drive and insight to shape a personal narrative that patterns and directs one's life.

Human flourishing

Each Education for human flourishing competency draws in different ways on the literacies and social and emotional skills. And each in turn supports one or more dimensions of human flourishing itself.

It is worth noting that other sets of competencies, designed to support other purposes, could be scaffolded by the literacies and social and emotional skills. Human flourishing may seem a compelling purpose, but it is not the only purpose possible. As we have seen, employment is an alternative purpose that has shaped education discussions for many decades.

Equally, we are not saying that individuals who are equipped with the human flourishing competencies are by definition flourishing human beings. We are not even saying that the competencies provide sufficient conditions for becoming a flourishing human being. The argument we make is that the competencies provide necessary conditions for becoming a flourishing human being.

Finally, formal education is not the only setting in which to develop the competencies. The family, the workplace and religious settings may all contribute strongly to their development (VanderWeele, 2017[6]).

For three of the human flourishing dimensions, the linkage with the competencies seems relatively straightforward.

First, the ability to build and maintain relationships is strongly supported by ethical reasoning, defined as responding to the needs and interests of others. Understanding the world underpins ethical reasoning, by enabling us to distinguish between other people's worldviews in order to identify what their needs and interests might be.

Second, the ability to find meaning in life is directly and explicitly supported by Understanding the world (knowing what matters to you and to others), Appreciating the world (responding to what is beautiful) and Acting in the world (identifying purpose, developing intent and shaping one's activities).

Third, in support of the accomplishment dimension of human flourishing, the related competency is Acting in the world. As we have seen, Acting in the world itself draws on the other competencies, especially Adaptive problem-solving.

The final human flourishing dimension is happiness, and here the important linkage is to the other three dimensions. It is success in building relationships, meaning and accomplishment together that arguably best supports happiness. And to this extent, all five competencies need to be engaged.

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4 Learning environments and pedagogical considerations for the design of Education for human flourishing

Introduction

In today's market economies with highly specialised work organisations, it is a given that students must embody sufficient competences to excel in their jobs. Furthermore, to participate meaningfully in contemporary democracies requires a good understanding of the issues of our times, many of which may initially appear to be science and technology in nature but are instead problems of the human condition. In general, we propose that an approach to education should provide young people with opportunities to develop wisdom about the features of a life worth living. Simply acquiring or developing knowledge, skills, or attitudes will not be enough. If we are to develop young people's abilities to creatively encounter the world, we must review our notions of what education constitutes and examine what forms of schooling are more likely to lead to people living lives of flourishing. The High Performing Systems for Tomorrow initiative has proposed five competencies that enable young people to flourish (OECD, 2025[1]). The central competency is *acting in the world* that draws on the competencies of *adaptive problem-solving* and *ethical competence*. Two other distinct competencies are *understanding the world* and *appreciating the world*.

To help young people to flourish in the world, education should not be reduced to *learning* in the traditional sense of acquiring knowledge and skills. 'Learning' in the English language is a verb that is not complete without specification of content, purpose, and relationships (Biesta, 2016[2]). The choice of what to teach our children is intimately linked to questions of power and ideals of flourishing. At the same time, young people can acquire the same piece of knowledge with a purpose to either uphold its legitimacy, or to critique it with an intention to replace it. Relationships between teachers, students, and the lesson content also play a significant role as these establish classroom cultures amenable to learning about human flourishing. Beyond learning, education is also about *being*, in the embodied sense of acquiring experiences, practices, and desires for flourishing. The school and classrooms must create learning environments and design learning processes that enable the children and young people to flourish in these ways.

This chapter consists of two parts. In Part 1 we consider what educating for flourishing might entail and propose three cross-cutting themes about knowledge, autonomy and technology. It then describes tangible and intangible spaces in learning environments that can support students' education for flourishing in relation to ideas in these themes. We argue that learning environments are not static or bounded but rather are the products of iterative and overlapping interactions of these spaces that reside within and beyond

individuals and societies of students. In Part 2 of this chapter, we explain a conception of active learning and propose an approach that consists of two key pedagogical features – teacher guided learning and experiential learning – for acquiring competencies for flourishing. We also discuss the place of technology-enabled pedagogies in promoting active learning and provide illustrations of how competencies for flourishing can be developed in a combination of learning spaces.

Part 1 – Designing learning environments to support education for flourishing

In educating for flourishing there is tension between received wisdom and self-determination. While the flourishing life is to be led in accordance with reason and virtue, this still leaves a great number of quests open for young people; many of which may not seem particularly appealing to the older generation. If self-determination poses the risk of pursuing trivial projects, received wisdom can also be accused of an unwanted imposition (Kitcher, 2022, p. 84[3]). As a general principle, we agree with Kitcher (2022[3]), that in order to live a flourishing life, one's choice of life project must satisfy three conditions: it must be autonomously chosen, it must be at least in principle achievable, and it must not conflict with the achievement of another's project. While young people may not be of sufficient competence to make these decisions completely for themselves, it is nonetheless important to give them opportunities to develop their autonomous desires.

The place of Artificial Intelligence (AI) in human flourishing may be attracting attention because of its topical pertinence, but its treatment must be seen as a special case of the ideas developed in attending to the problems of Science, Technology, and Societies (STS). STS is a novel interdisciplinary field of study that emerged in the 1960s. While schools do not typically teach interdisciplinary subjects, let alone STS, its findings are nonetheless significant. In this chapter, the main STS principles adopted are the significance of technologies as intention amplifiers (so that a proper understanding of technology must begin with an analysis of intentions), and that artefacts are imbued with politics to begin with. We propose a critical perspective to science and technology as a pedagogical orientation that may attend to the flourishing goals, to educate young people away from discourses of inevitability. We argue that such an approach is more likely to give young people the resources to think productively about their own futures.

The above perspectives when combined with current thinking about flourishing expands ideas for the design of learning environments. Considering the role of teachers in the educational interaction (not just "learning") opens the space for how young people may emulate competent human behaviour and develop their own plans. Teachers, as qualified adults in society, must have some insight on flourishing and must possess some practical wisdom about how to live in the world. Beyond communicating valued knowledges and skills, education is also about the nurturance of desired dispositions, in no small part by actively modelling the forms of practical wisdom and ethical competence within the community of the school.

Thinking about the learning environment must extend beyond the physical infrastructure, to also thinking about the sociocultural patterns of being. While teachers are significant members of these collectives, students are not to be considered as mere recipients of knowledge. Especially for inventive behaviours, teachers face the difficult task of heralding the intentions of young people, some of which may even stand in opposition to existing ideas. While the role played by teachers *and* students in creating, maintaining, and growing the learning environment is complex, it cannot be overlooked in preference for principles which appear to give a sense of control and predictability.

In the section below, we introduce three cross-cutting themes that respond to the problem of flourishing. It demonstrates these themes as they may be applied across seven modes of understanding the learning space. These modes of analysis can also be considered metaphorically to be multiple filters which help us

understand the phenomenon of learning in the classroom. Just like how sunlight appears as white light, learning occurs in schools as a holistic phenomenon. However, just as being able to see in the infrared and ultraviolet (as well as other colours in the visible spectrum) allows us access to phenomena formerly invisible, distinguishing these seven learning spaces allows us multiple ways of thinking about the educational interaction.

A. Learning for human flourishing: Three cross-cutting themes

What constitutes a life of flourishing is subject to contention as it may never be clear what arrangement of conditions constitutes a life of flourishing. In considering education for human flourishing, one of the goals we have adopted is the promotion of young people's autonomy in support of enlarged senses of happiness, meaning, relationships and accomplishments. This assumes that a life lived purely under the direction of another is unlikely to be a life of flourishing. Adopting such a goal for schooling is not trivial, as autonomy is never absolute. One's autonomy to do as one pleases is limited by nature and the existence of others (Biesta, 2020[4]). To achieve autonomy, one must not only understand nature, but one must also understand the sociocultural rules governing moral behaviour. The knowledge of nature and sociocultural norms have been organised over time in disciplinary forms of knowing, and in the main it is for the acquisition of these forms of knowledge that parents will make sacrifices to send their children to school (Young, 2008[5]).

The three themes in this section attend to: (i) the principles of learning associated with the acquisition and transcendence of knowledge in the disciplinary domains; (ii) the risks of educating for autonomy; and (iii) the role of technology in the learning environment. These themes are a response to competencies identified for human flourishing. For example, adaptive *problem-solving* cannot be effectively done without due consideration of the disciplinary bases that the problem lies in. Whether or not adaptivity is a generic skill amenable to transfer is still unresolved, but there are insights from the nature of knowledge forms that can be useful for this competency as well as for *interpreting the world*. To teach young people how to interpret and *appreciate the world* will involve more than mere exposure. It also requires understanding human connections with the natural world and the development of the 'trained' senses which affords more reasons to appreciate the value of an aesthetic experience. Developing students' autonomy will naturally confront students with the need for *ethical thinking* as well as confidence to *act in the world*. Finally, we propose to attend to the opportunities and risks associated with AI by introducing principles derived from STS to help young people learn with and about technology. Table 4.1 presents a summary of the main ideas in these themes which will be discussed in greater detail next.

Table 4.1. Themes and principles in learning environment design and development

Theme I: Disciplinary forms of knowledge as constraints and enablers.	Theme II: Student autonomy and the risk of educating for it.	Theme III: Learning with technology; learning about technology
Learning design is determined by learning goal, which should be established first.	Offer students opportunities to test their intentions and learn from the mistakes they may take.	Technology should be utilised in the service of complex educational goals.
Learning environments need to make epistemic reasoning visible.	Embrace and preserve the risks involved in the cultivation of the new generation to decide for themselves how best to live life.	Technological education should be an education in the humanities as well as the technology itself.
Tacit knowledge that cannot be represented exists; how it is acquired will continue to be through apprenticeship.	Create and support trust rather than enforce accountability. Treat young people as democratic equals: education is done with them, not to, or for them.	Students should learn about technology as much as they learn with technology.
Disciplinary considerations influence pedagogical design.	Instead of anxious striving, trust students to come to similar conclusions as adults about the intrinsic value of ideas for human flourishing.	Technological education goes beyond technical know-how to take account of the intricacies in the use of technologies in social and cultural contexts.

Disciplinary forms of knowledge as constraints and enablers

Students go to school to acquire knowledge. Knowledge is organised in disciplinary forms and must continue to have a role in Education for human flourishing. These forms of disciplinary organisation are social constructions but are often limited by non-negotiable boundaries in nature and culture. Learning environments need to be designed in ways that make these boundaries and organisational structures clear to students. Students should neither needlessly 'reinvent the wheel', nor be overly constrained by arbitrary conventions and be prevented from thinking past existing ways of understanding our world.

The nature of knowledge forms

The ancient Greeks divided knowledge into episteme, techne, and phronesis, corresponding to scientific, and technical knowledge, as well as practical wisdom. When we think about formal schooling, we far more often associate it with episteme and techne, and to a lesser extent, the practical wisdom of phronesis. It can seem seductive to focus on the high-status episteme and techne for their centrality in contemporary forms of high value economic activity. However, education for flourishing requires young people, individually and collectively, to engage with questions about value and what one ought to do with limited resources. Responses to these questions are the knowledge of phronesis and have a peculiar patterning distinct from episteme and techne. While episteme and techne can provide exact responses, phronesis is highly context dependent and subject to individual interpretation.

The nature of these knowledges already suggests different learning environments for their acquisition. For knowledge which is amenable to decontextualised abstraction and is accessible to many, mass

transformation of information such as lectures may appear adequate. (Part 2 explains why even such forms of knowledge should involve learning that is active and engage students in inquiry that is guided by the teacher). On the other hand, for practical wisdom and other forms of knowledge which involve subjective interpretation and embodied learning, methods resembling apprenticeship may be more appropriate. In this section, the influence of the nature of knowledge on learning environments will be explored. In designing learning, it is important to keep in mind the nature of knowledge that is to be communicated; there is unlikely one universal method of instruction that is knowledge agnostic. For instance, digital storytelling may be a good approach to teach concepts in the humanities such as the golden rule, as the rule can be instantiated in multiple different contexts, demonstrating its productivity. On the other hand, for other concepts which only admit singular interpretations such as many of those in the natural sciences, digital storytelling may not work as well (Tan, Lee and Hung, 2013[6]).

This is an argument for recognising a diversity of approaches to designing learning environments, based on the learning goals intended by the educators. The goal may not always be the efficiency of communication, as when teachers want students to develop for themselves their own autonomy and in(ter)dependence – vital preconditions for a life of flourishing. Doing so may require students to confront difficult questions or experiences, which may not necessarily be pleasant experiences. The design of learning must therefore be determined by the learning goal, which should be established first.

What constitutes flourishing and how collective efforts in flourishing might receive enough widespread support needed for success are significant educational projects. Designing learning environments given these epistemic considerations requires educators to provide opportunities for collective engagement with the foundational basis of truth claims, as well as an exploration of the range of reasonable truth claims given a certain empirical phenomenon. Such explorations may appear more likely for phenomena that are personally experienced, and are subjective, embodied, or require human interpretation. For instance, whether societies are just and non-discriminatory can vary depending on one's social location. How communities are supposed to make sense of data to arrive at conclusions can become contentious. In sum, learning environments need to make the epistemic dimensions of knowledge clear to students. It is not enough that they know; they need to know why they know.

Education as apprenticeship

For educators, understanding the nature of knowledge and education has implications for how learning ought to occur. When knowledge takes more experiential, embodied forms and education is a process through which students learn to be, then apprenticeship may be a better approach. Human flourishing requires knowledge of both the representational and experiential forms, as when, for instance, we may want students to develop the ability to delay gratification. Introductory lessons can do a good job of initiating students to the concept, but then it can be challenging to discern how one's actions ought to be determined according to this principle. At what point does delaying gratification become unnecessary deprivation or being miserly with oneself? Responses to these kinds of questions require artful responses, and apprenticeship relations may be ideal for learning the nuances to these responses, leading to the notion that such aspects of character education are 'caught, not taught'. Being able to learn through the emulation of experts will continue to be important as an educational process, simply because not everything is reducible to representational forms.

Experiential and embodied knowledge occurs especially in physical activities and in material processing practices such as working with one's hands or with tools and technologies (Crawford, 2009[7]; Ingold, 2004[8]; Magnani, 2004[9]). To learn how to play rugby, ride a bicycle, or perform surgery, there is no good substitute to doing these activities. It is appropriate to consider the whole body in our approach to education. While contemporary technologies can offer simulations, students should continue as far as

possible to access these experiential forms of learning. The disciplined ways of knowing in these embodied forms of knowledge can be particularly inefficient to acquire. As with learning to ride a bicycle, one can only make these experiences accessible, and trust that students try their best as they inevitably fail in their early attempts. Learning environments must be particularly open to students' learning from failure.

Student autonomy and the risk of education for it

Life projects of flourishing must be autonomously chosen by those who will live it. For young people, their capacity for making these decisions, given the range of options typically available, is necessarily limited. However, this is no rationale for indefinitely deferring their acquisition of the desire for wisdom on these matters. Treating young people as competent and responsible will be risky, as they may make decisions which may be mistaken—they may fail. Learning environments need to be designed in such a way that is open to students learning from failure and to ensure a 'low cost' for failures in providing the means for the development of wisdom in learning from these failures.

Education must always have a reproductive aspect to it. There are cultural achievements of humanity which deserve reproduction, and young people can and should learn from the mistakes of the past. However, not all traditions are worthy of such treatment, and indeed, some traditions can be abhorrent, and societies would do better without them. A currently uncommon approach but which we advocate may be the treatment of young people as democratic equals, and where education is an act that educators do with students and not to students. In opposition to the position that educators have knowledge to transmit to young people, education can be the nurturance or cultivation of certain already existing qualities that are likely to be immanent in all humans—traits such as conscience, empathy, and curiosity.

The outcome of this orientation to education may produce unpredictable outcomes. Some educators and policymakers may complain that such an orientation places great risk on the educational interaction: there cannot be any guarantees that we will get the outcomes that we desire. Yet, as Biesta asserts, that may precisely be the point—the moment we eliminate the risk, and institute a system to guarantee an outcome, will be the moment that the interaction stops being educational (Biesta, 2016[2]). As educators, the ethical position is to not close ourselves off from the possibility that young people may arrive at a better answer to the question of human flourishing, than whatever we have now.

Wuwei (无为) as a teaching disposition for flourishing

To design learning environments that are amenable to these forms of nurturing autonomy will require educators to adopt a different orientation to instruction. Consider, for instance, the problem of educating for abilities in adaptive problem-solving, or ethical decision making. While there are certain skills that can be developed through a deliberate, programmed, practice, educators always have to hold back from an excessive direction of the students' decision making as doing so removes the possibility of students learning how to do it for themselves. How to manage this interaction is the topic of this section.

According to Lobel (2017[10]), while the Confucian master is steeped in rituals and rules governing the correct behaviour in every circumstance, the Daoist sage acts with effortless ease. The Daoist concept of *Wuwei* (无为) presents itself as a constructive paradox that might serve as a useful principle-to-think-with when it comes to the design of diverse learning environments. The literal meaning of *Wuwei* is that of non-doing, inaction, inexertion; however, its actual signification is closer to the concept of effortless action, a way of acting that avoids anxious, effortful striving in order to bring about a state of affairs which may not be ready to be manifested. Instead, and in recognition that nature has a particular order and trying to bring about change when it is not ready is not productive, *Wuwei* recommends a careful study of the

circumstances, and only acting when the time is right. Thinking with *Wuwei* in education presents a different perspective for policymakers; just as plants are quietly nurtured by the nutrients of the field:

> *A child is nurtured, sheltered, and protected by the parent who stands by and allows her to express her own individuality, in contrast to the one who pokes and prods—like the character in Mencius who pulls up sprouts to try to help the grain grow and inadvertently destroys them. Wuwei is thus a way of being that supports and nurtures growth without being aggressive, intrusive, or overbearing. This is a way of teaching as well as ruling (Lobel, 2017[10]).*

If what we desire our young students to learn is precious in and of itself we should trust them as rational individuals to be able to arrive at this conclusion; anxiety on educators' part may be counterproductive. *Wuwei* is not a philosophy of inaction; it is merely the avoidance of *unnecessary* action, and anxious striving which may be unproductive, especially when the circumstances are not ready.

For many in schooling systems around the world, far too much effort is directed towards credentialism and the instrumental purposes of schooling. Young people need to find for themselves their own answers to the questions of meaning and purpose in life. Seen from the lens of *Wuwei* it is clear that while schools do have a responsibility to provide opportunities for students to try different projects, it cannot coerce or constrain students' choices one way or another—learning environments must be designed for teachers to model *Wuwei*, and for students to emulate it. Our aims for education for flourishing must be open ended, because contained within all interpretations of what education ought to be about are visions of what values, competencies, and human excellences would be ideal for living the good life. As our quest for better answers to what constitutes the good life continues with no clear end in sight (Harðarson, 2012[11]), so, too, must we continue to provide young people with the open ended-ness that they need to arrive at newer and better answers to these questions (Katz, 2011[12]).

Learning with technology, learning about technology

As Clarke (1977[13]) asserts: "Any sufficiently developed technology is indistinguishable from magic". Many educators are comfortable in teaching with, and using, technologies. However, fewer are as proficient in teaching how technologies work, and how they interact with, and shape, human desires and intentions. Technologies are not neutral objects and can even be implicated in decisions of high moral import. Especially with contemporary technologies imbued with machinic intelligences, carrying with it the intentions of their designers, learning how technologies work becomes vitally important. 'Decoding' intentions in technologies and thinking about the societal implications of mass adoption requires a diverse, interdisciplinary knowledge base. Learning environments should be designed with interdisciplinarity in mind to provide students with multi-dimensional insights into contemporary problems. Given the extensive role technology (interpreted widely) plays in societies, a factor that requires consideration is the appropriate relationship humans ought to have with technology.

Technology is not neutral

When we think of human flourishing, especially in contemporary and future oriented terms, we often think about technology, either from a point of concern that, for instance, advanced computing technologies and robotics will make entire economic sectors obsolete; or in salvation terms, as in technologies that will save us from the impending climate catastrophe. Technology is not just the special case of info-communications technology that many people around the world are now obligated to be accompanied with. More generally, technology refers to any kind of human-made artifice designed to amplify human intentions (Toyama, 2015[14]). Just as an excavator can amplify one's desire to dig a hole in the ground, smartphones can amplify another's desire to be 'heard' by as many people as possible. The significant question to ask when it comes to the deployment of technology is never "will it work", but rather "what/whose intentions are being

amplified." Technologies carry with it political intent (Winner, 1980[15]; Wyatt, 2008[16]), from the large scale as when a decision to build a hydro-electric dam demands the resettlement of entire communities, to the microscopic when social media applications deploy known addictive methods to increase 'user engagement'.

What ought the educational response be, especially if human flourishing were to be the goal? At the outset, it should be clear that an education *about* technology ought to be part of the curriculum for all students. Young people must not be deprived of the power that comes from understanding how the world around them works. One might counter that we do not all need to be mechanical engineers to drive cars, but when something does go wrong, not having competence leaves us in a powerless position. Education about technology needs to be sufficiently critical, giving young people the ability to 'read and write' intentions in/through artefacts.

Education about technology requires interdisciplinarity

The educator response to these and other issues of technology would require an interdisciplinary approach. Knowing about technology itself is obviously insufficient, and ethical deliberation without technical knowledge makes one susceptible to preparing inaccurate responses to exaggerated claims of technology used to generate interest and funding (van Lente, Spitters and Peine, 2013[17]; Vinsel, 2021[18]). Much can be achieved with an appropriate attitude towards technology—while it can be common to approach technology in an almost reverential manner treating inventions as the work of inspired genius, this need not be the only way. A more critical approach can instead treat technological artefacts as merely instances of solution to problems. These problems have simply been deemed by communities to be desirable to solve. Students can learn to contend with these rather arbitrary choices: there could be better solutions, and communities may be wrong (or be misled) to desire these problems solved.

Designing learning environments for these considerations requires educators to care for far more than the communication of valued knowledge. There are cultural values that need nurturance (Tan, 2018[19]; Toombs, Bardzell and Bardzell, 2015[20]), and ethical decisions to be made over which boundaries are legitimate (and should not be crossed), and which others are otherwise. Educators pursuing this form of technology education need a learning environment where there is trust that all involved will make decisions with appropriate judgment. For instance, in order to learn about security, it may be necessary to learn about lock picking of the physical or digital form (Mitnick and Simon, 2005[21]). While it is impossible to guarantee that students never use these skills for nefarious purposes, it is also not reasonable to never teach these skills out of distrust. If we hope that future generations will develop different solutions for existing problems, we need to give them *all* the tools, knowledge, and intellectual orientations that are needed to do so.

Artificial intelligence in teaching and learning

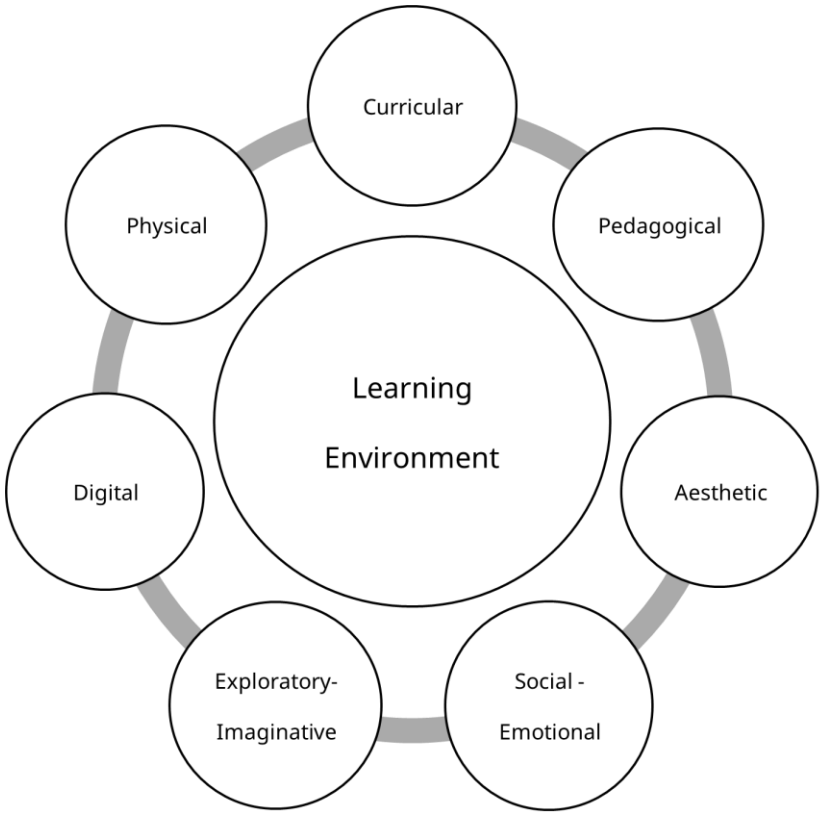
The history of technology in education has been one of breathless excitement about how the 'next big thing' will 'change education forever', followed eventually by education remaining resolutely unchanged (Cuban, 2001[22]). More recently, a similar outcome met the overblown rhetoric of the promoters of the One Laptop Per Child project, who claimed that their computers could almost literally be flung off helicopters, and positive results would await them when they returned again later (Ames, 2019[23]). We might however be making a mistake if we were to assume that Artificial Intelligence/Machine Learning (AI/ML) would result in no changes or ignore it altogether. We would be better *off* learning the lessons of history and appreciate the complexity of the educational interaction as we cautiously engage with these new technologies in education.

Education is not merely the communication of conceptual knowledge; education for human flourishing will be even more challenging for AI/ML systems trained on historical data sets (Goudarzi, 2023[24]; O'Neil, 2017[25]). If we want the possibility for future generations to arrive at currently unforeseen ways of being, human educators who can make appropriate judgments about appropriateness will remain essential. AI/ML will have a role in the assistance of human educators, who must remain as the final moral agent responsible for educational decisions (Cerf and Waytz, 2023[26]). Just as the nature of arithmetic calculation has changed with the advent of calculating devices, we can automate repetitive tasks to give educators and students alike more time to accomplish the challenging tasks.

B. Learning environments and spaces for flourishing

We define a learning environment to be a set of cognitive, social, psychological, technological and physical conditions created to support and enhance the learning process for students. We propose seven interacting *spaces* which constitutes several well-developed ways of thinking about the education interaction. These are the: (i) curricular; (ii) pedagogical; (iii) aesthetic; (iv) social-emotional; (v) exploratory-imaginative (vi) digital and (vii) physical spaces, as shown in Figure 4.1. Across all these spaces, the three inter-linked *themes* of knowledge, autonomy and technology pose productive tensions for which to make design decisions in learning environments.

Figure 4.1. Seven spaces of the learning environment



Spaces for learning and flourishing

Learning environments are often conceived as tangible and observable spaces where learning takes place. Some examples include the classrooms, gymnasiums, science laboratories and schools. While these physical spaces can cater to specific types of teaching and learning, they are only one aspect of learning environments. We suggest that learning environments should instead be conceptualised as both tangible and intangible spaces, with the latter occurring as cognitive, social and affective processes within learners to support their learning, and ultimately their flourishing as individuals.

Learning environments are therefore not static or isolated but are the iterative outcomes of interacting tangible and intangible spaces which can be complex and unpredictable. Human learning is never an exact science. Curricular decisions that are made at the system level can produce effects in classrooms, and conversely teachers can modify the intentions of state and local policies in significant ways through their pedagogies and curriculum enactment. At the same time, students' internal learning processes that encompass an appreciation of the aesthetic, an exploration of ideas and the imagination, and the perception and management of emotions will interact with the tangible spaces. Educators should pay attention to these spaces and consider the ways they interact to provide students with optimal experiences to learn and grow. These spaces can be designed for resonance with the themes discussed above that provide principles for designing learning environments. In the following sections, each of the seven spaces is described to explain why they are crucial to the creation of learning environments.

The curricular space

A curriculum consists of clear learning goals for students that comprise knowledge and skills. In some curriculums, affective outcomes of attitudes and values are also included as learning goals. Implementing a curriculum is never straightforward as the overall outcome will depend on factors such as the teachers' use of pedagogy, assessment practices, teaching material and learning experiences created in and outside a classroom. The planned curriculum offers the space for creating learning environments in which students can potentially flourish in classrooms and schools. Planned curricula, however, remain static until they are enacted by teachers to create the kind of experiences that have been planned for students' learning (Marsh and Willis, 2007[27]). Apart from the academic content to be covered, curriculum designers will also exercise their own judgments on what content or processes to exclude. This "excluded curriculum" can have an impact on students' development and shape their thinking, knowledge, values and attitudes as much as what is included.

Students go to school to 'get an education' and not merely be trained in knowledge goals. To achieve the competence of adaptive problem-solving, for example, teachers should be ready to adjust the curriculum according to problem being attempted—this is as much a demonstration of adaptive expertise as it is being authentic to the problem at hand. While the flourishing life is to be led in accordance with reason and virtue, this still leaves a great number of quests open for young people; many of which may not seem particularly appealing to the older generation. Consider, for instance, popular music or other modes of expression—almost universally, older people do not understand young people's fashion sensibilities. Educators therefore play a crucial role in heralding the new, in recognising and encouraging novelty, yet necessarily confronting young people with limits imposed by nature and other humans. All this foregoing cannot be closely pre-specified and must be implemented by an educator competent in the phronesis, practical wisdom, of the educational interaction.

Considerations in the curriculum space to achieve education for human flourishing must consider disciplinary ways of knowing. Learning to act in the world is most ideally done "on the shoulders of giants" that have come before us. Acting in the world also requires a measure of autonomy to achieve one's

intentions. The curriculum space is where educators must make decisions about classroom experiences which introduce students to the ‘shoulders’, as well as the possible ways in which the young might eventually surpass them. Lastly, technological interactions with learning constitute modifications in the curriculum, and should be carefully considered.

The pedagogical space

Pedagogy refers to teaching methods for delivering the curriculum to the students. It is founded on one or more approaches to teaching which are based on theories about learning. Key pedagogical approaches include constructivist, collaborative, reflective, integrative, inquiry-based, problem-based, team-based and appreciative inquiry. In the current drive towards using technology for teaching and learning, the pedagogical space will invariably include the use of pedagogies. It is in the use of appropriate pedagogies that students’ learning is fostered.

Teachers’ pedagogy is the result of their pedagogical content knowledge, that is the integrated knowledge of how to teach a particular academic subject and the content or disciplinary knowledge of the subject (Shulman, 1987[28]). This knowledge may have been acquired explicitly through training and education and strengthened over time, but there may also be implicit views developed and distilled over the course of the teachers’ own professional experience. On balance, a teachers’ general pedagogical knowledge, that is strategies for teaching and organising classroom experiences, is just as important because subject specific pedagogies are usually based on the broad principles and strategies.

Pedagogies must not be considered as distinct, as a communication mechanism that is akin to how smartphones communicate on different channels (Wi-Fi or cellular) without modifying the content of what is being communicated. Indeed, the medium is the message. In education, how we educate can be as important, if not more important, as what we educate. For example, if we are interested in the creative efforts that accompany adaptive problem-solving, an anxious desire to make sure students ‘get’ school knowledge can interfere with students’ own investigations. Pedagogies are not to be considered only as the deliberate acts of educators, but also the implicit actions and inactions that are part of the daily educational interaction.

To develop competence in appreciating the world, pedagogies must be carefully chosen. It is not so simple as to present students to the world; certain ways of interacting with it can provide more joy than others. Pedagogies must be carefully chosen to preserve these ‘ways of being’. Technologically mediated forms of pedagogy are prime areas for research currently, with technologies assisting and affording learning intentions such as active learning, rapid feedback, collaborative discourse, making thinking visible, using multimodal representations, as well as asynchronous and distributed (in space) forms of learning.

The aesthetic space

Aesthetics is the study and practice of beauty. While it can be common to think of aesthetics as an afterthought or as a form of luxury that one can afford once basic needs are met, we suggest instead that (aesthetic) appreciation of the world is central to a life of flourishing, along with an appreciation of truth and goodness. Although aspects of aesthetic appreciation can be culturally determined, there is likely to be a strong innate, transcultural component. Design of the aesthetic space for human flourishing may take into account the distinction between forms of appreciation which may be more innate or timeless, as opposed to aesthetic forms which are more locally determined. The aesthetic space can be a location for critical discussions about why some experiences and representations are considered superior to others, and a venue for students to learn to act in the world.

Learning environments that are designed with aesthetics in mind are not merely beautiful spaces in which teachers and students may feel at ease and be inspired for the educational interaction. Learning environments can also be designed for an education in aesthetics. For flourishing, such an education should help students connect their sensations of aesthetic experiences with culturally established understandings of what constitutes desirable aesthetics. A critical education in the aesthetic space would offer students opportunities to evaluate existing norms, propose meaningful shifts in cultural values, and where appropriate, usher in these shifts. While much of aesthetics may have become debased by capitalist influence in contemporary media industries, it is still important to appreciate the potential for aesthetics to point the way for critique, or more constructive visions of what flourishing may be.

In this regard, an education in aesthetics should be essential for all.

The social-emotional space

Social and emotional learning (SEL) is the development of a combination of skills and dispositions that enable students to flourish as individuals. Although these skills are often referred to as "soft", they are as important as skills that are associated with academic content learning. This characterisation of 'softness' has no relation to its ease of acquisition, but rather its resistance to 'hard' rules and boundary conditions. Indeed, acquiring these skills are highly important and a central component of 21 Century Competencies. When students develop social-emotional skills they develop a more positive image of themselves, strengthen their ability to manage negative emotions, motivate themselves in learning and improve interpersonal relationships with others. Relatedly, they also grow in confidence to collaborate with others and can in future contribute positively to society as they cultivate strong moral character and values. SEL remains one of the most powerful influences on children's learning. It improves academic achievements, increases pro-social behaviours and strengthens positive attitudes towards self and school (Durlak et al., 2011[29]). Successful SEL training programmes can help students develop five key skills: self-awareness, self-management, social awareness, relationship skills and responsible decision making (Collaborative for Academic, Social, and Emotional Learning [CASEL], 2015[30]).

Learning environments that consider the social-emotional space use pedagogies and activities that promote reflection and self-awareness, demonstrate humanity, offer explanations, encourage collaboration, include perspectives sharing, acknowledge negative emotions, celebrate positive emotions, explore difficult issues, and grow interpersonal and social empathy. While SEL can be taught through the formal learning curriculum, it is best offered to students in the context of their lived experiences. This would naturally include lessons in the classrooms but should include the wider learning environment of extra/cocurricular activities and the overall school culture. Learning how to be part of human endeavours that are larger than the Self (Biesta, 2020[4]) must be a central part of education, and designing the social-emotional space that encourage ethical reasoning and expressing oneself is an important part of flourishing.

The exploratory-imaginative space

In schools, the exploratory and imaginative space typically refers to the forms of 'magic' talented educators can do to bring their students along on a flight of fancy. This space is where literary (and other forms of) fiction exists and is also the space where creative speculation is developed. Exploration and imagination occur not only for fiction but can also be a useful means of instruction. For instance, using embodied cognition approaches to learning, teachers can use the physical space and students' senses to teach mathematical concepts; e.g. Nemorovsky et al. (2012[31]). Educational projects in creativity will utilise teachers' abilities to use and develop the space for students' participation. It is possible to design such a

space to be more, or less, inviting, by manipulating the aesthetic or physical space, and by adjusting the parameters and 'rules' for participating in this space.

Humans have a singular talent in exploration and imagination, and we can follow along and inhabit imaginary worlds. Learning can occur in these spaces, especially if the socio-emotional circumstances of the classroom are taken care of. While interactive forms of digital media (e.g. virtual/mixed/augmented reality systems) have been in the spotlight in recent years, one particularly effective way of organising exploratory- imaginative spaces is using games, in physical education most notably, but also in the classroom through board games or simulations. The use of drama techniques for the classroom can also engage students in exploring and imagining. Exploration and imagination are not limited, however, to creative and artistic forms of engagement. It can occur through talk amongst students and with their teachers. Talk is an important means of exploring ideas and imagining alternatives and possibilities by thinking together even for young learners in schools (Goh, Sabnani and Renandya, forthcoming[32]). Learning environments that allow students to think collaboratively and reach outcomes through talk not only contribute to their social and cognitive development but also develop their ability to act in the world through speech upon leaving school (Mercer, 2002[33]).

The digital space

The digital space exists with the application of technological tools for teaching and learning in the classroom. It changes the pedagogical space by creating new experiences for students. It is also found as a hybrid environment of lessons conducted synchronously over the internet with video conferencing and teaching platforms, as well as in asynchronous learning activities that teachers have prepared for students to attend to at their own time and pace. This space also exists literally in worlds and cyberspaces created by technology. Contemporary digital media technologies have become increasingly powerful in their abilities to the point that it is becoming realistic for individuals to develop simulated avatars in interactions with other characters. Starting from text-based forms of communication and online fora in the later part of the 20th century, technological developments have continued apace. Today participation in Massive Multiplayer Online Role-Playing Games (MMORPGs) is routine, and digital technology companies are attempting prototype versions of the science fiction online agora of *Ready Player One* (Cline, 2012[34]). Whether or not these efforts are effective, these spaces are an artefact of the human inclination toward social behaviour and the maintenance of social norms.

The digital space can serve as a venue where the rules of reality can be temporarily suspended in favour of others selected based on curriculum and pedagogic considerations. This affordance can simultaneously be helpful or harmful, especially when we consider how virtual conversations about the state of society are actively influencing sociopolitical conditions around the world. Young people increasingly need to develop competencies in acting in this 'layer' of the world. The cross-cutting theme of autonomy reminds us that design considerations for this space must include opportunities for students to act autonomously, despite the associated risks that accompany it.

The physical space

The physical space for educational interaction is certainly a vital space to consider. While the COVID-19 pandemic has demonstrated that some forms of education can occur online, it has also shown the importance of physical spaces for educational interactions. The design of physical spaces as part of the educational design is most strongly associated with the Reggio Emilia method of education originating from Italy. Space is considered the 'third teacher', after one's teachers and peers. Physical spaces are especially useful for collaboration, can hold artefacts which represent societal values, and can be a canvas for exhibiting lasting representations of the ideas that are discussed in the aesthetic and imaginative-

exploratory spaces. In addition, a well-designed space will be necessary for learning embodied forms of knowledge such as reading and literacy development in school libraries (Loh et al., 2021[35]). The entire school can also be the physical space that promotes learning, as a documentation of children's voices have shown how built environments can influence their learning experiences (Burke and Grosvenor, 2015[36]).

The design of physical spaces such as a classroom must consider the other spaces as discussed above. For example, digital spaces will require physical spaces to connect devices, both in the electrical supply sense, and in the metaphorical sense of needing physical space to arrange computing machinery to participate in online communities. Curriculum and pedagogical considerations matter, too. If knowledge is tacit and requires apprenticeship to acquire, large classrooms with many students will not work. Nevertheless, this can be mitigated by the provision of suitable furniture for reconfiguration of large class teaching to small group interactions and explorations. The surroundings in a classroom can immerse students in aesthetic appreciation, knowledge enrichment and learning discoveries. The traditional notice boards and walls surrounding the room can be transformed to spaces of beauty, creativity and knowledge. Whatever purposes these physical surroundings may serve, the physical space of a classroom should continue to be important places for learning and discovering the joy of learning.

Summary

In Part 1 of this chapter, we examined the central concerns of three cross-cutting themes of knowledge, autonomy and contemporary technologies in the context of education generally and education for flourishing specifically. We attempted to address the dialectical balance between these factors that are perpetually in tension. Principles emerging from these themes were applied to seven tangible and intangible spaces in learning environments that collectively create the conditions for learning. The interactions of these spaces that represent physical conditions as well as cognitive, social and affective processes are essential to helping students acquire knowledge, skills, experiences and aspirations to live a flourishing life. Education, given all its complexity and context sensitivity, requires wisdom and discernment to carry out well. The recommendations proposed here are not prescriptive solutions but invitations to engage with the deep ethical, cultural, and existential dimensions of education. They are guided by the belief that human flourishing involves more than measurable outputs; it encompasses the development of judgment, character, relational capacities, wisdom and a sense of purpose. Such aims require educational environments that nurture dialogue, creativity and moral imagination—features that may be neglected when education is framed solely in economic or technocratic terms. By reorienting our vision toward these richer conceptions of what it means to be educated, we hope to foster not just more competent individuals, but more humane and resilient communities at a time when it is needed more than ever.

Part 2 – Pedagogical considerations for active learning of competencies in Education for human flourishing

This part of the chapter builds on the previous discussion of educational approaches and presents pedagogies for developing active learning of the education for human flourishing competencies. We consider the five competencies – acting in the world, ethical competence, adaptive problem-solving, understanding the world and appreciating the world – as akin to curriculum goals, for which pedagogical principles influence the attainment (or otherwise) of these goals. Importantly, how these goals are to be achieved will also constitute the curriculum for human flourishing.

We discuss conceptions of active learning and explain teacher guidance and experiential learning as pedagogical features that can promote the learning of human flourishing competencies by young people. Next, we focus on technology-enabled/ enhanced active learning and illustrate this with examples of teaching methods and tools used at the National Institute of Education (NIE) Singapore. Insights from these discussions are applied to draw implications for developing education for human flourishing competencies. We include an exemplar of how technology is leveraged across various tangible and intangible spaces in learning environments to achieve the same purposes. We end with another exemplar that highlights how pedagogical considerations interact with cross-cutting themes in education, learning spaces and education for human flourishing through makerspaces for developing the adaptive problem-solving competence and other competencies.

What is active learning?

Active learning is a process where learners are deeply engaged with what they are learning rather than being passive recipients of information conveyed to them. Students who are actively engaged manifest their engagement cognitively, behaviourally and emotionally (Fredricks, Blumenfeld and Paris, 2004[37]). Cognitively, engagement is not just a matter of giving attention to what they are trying to learn. Students are also mentally processing items of knowledge by manipulating and transforming the content that they are given or have discovered on their own. Behaviourally, engagement processes are demonstrated in the interactions learners have with one another in activities. They discuss, debate, and collaborate in pairs or small groups to share their knowledge and perspectives to develop their understanding of a topic or a concept together. Emotionally, they demonstrate interest in the topic, motivation to continue working on a task, confidence as they work towards attaining a goal, and even anxiety when they encounter challenges in their learning tasks and activities. Because student engagement drives learning, active learning during an activity or a task in class often leads to positive outcomes (Christenson, Reschly and Wylie, 2012[38]).

The phenomenon of active learning can be understood through the lens of the constructivist theory of learning, where learners build their understanding and knowledge through experiences and interactions and connecting new ideas to existing knowledge to form new understandings (Bransford, Brown and Cocking, 1999[39]). A social constructive view of learning sees learning occurring through social interaction with others, such as one's teachers or classmates. Learning takes place when students solve problems beyond their current development level with the support of their instructor or peers (Vygotsky, 1978[40]; 1962[41]). It also occurs within an individual's cognition as new knowledge is incorporated into increasingly comprehensive and complex mental models known as schemas or schemata (Piaget, 1983[42]). When learning actively, individuals are engaged metacognitively in 'thinking about their own thinking', making sense of their own learning processes, challenges and strategies for making learning more successful (Flavell, 1979[43]). In the process they also develop a deeper understanding of themselves as learners in their learning environments (Larkin, 2025[44]). These different perspectives on learning that involve the individual learners and the environment that supports their learning reflect the complex processes of active learning where different types of intra-personal and inter-personal engagements work together to achieve knowledge and understanding.

Conceptual roots

Many of the pedagogical conceptions that educators in the 21st century call "progressive" and "innovative" can be attributed largely to the ideas of John Dewey of how children should learn actively, and how adults and the education system should support students in providing them with learning environments to develop cognitively, socially and emotionally. Dewey's thinking about learning that was set out in his 1938 book "Experience and education" ([45]) continues to be relevant today. Dewey stressed the importance of active

learning through experience, by being engaged in the process of learning in doing things and inquiring into a problem through critical thinking. He emphasised that learning is a continuous process grounded in experience. Dewey's ideas have been adopted in teaching approaches that flipped the role of teachers as founts of knowledge dispensing information to be received to that of a guide and a facilitator, who supports learners in exploring, discovering and building knowledge for themselves.

The importance of reflection that connected knowledge with its applications in life was also emphasised. Learning experiences, Dewey argued, must be developed from the learners' perspective, and that it is important for these experiences to be age and developmentally appropriate. Moreover, children learn best when interacting with others such as adults and peers. A child's interaction with the environment is critical to creating a unique experience where learning can take place. The environment, or the situation that an individual interacts or transacts with, comprises different actors that are not limited to just people in an interaction, but also the books they are reading, or materials used in an experiment or other learning activities. In other words, learning environments are not confined to physical spaces but are constructed from conditions or situations (which we call 'spaces') that enable new experiences for learning to occur. Dewey also believed in the importance of community, and how communities should work together to solve problems for society and bring up children as moral and ethical individuals. The primacy of learning environments is indeed core to our thinking about how to help students flourish today. The pedagogical space is particularly key to offering students rich and transformative learning experiences made possible by the interactions of tangible and intangible learning spaces as described in Part 1 of this chapter.

Pedagogies and learning

The literature on teaching and learning has many terms to represent pedagogies that are deemed innovative and progressive, and relevant to the teaching of curricular subjects. These methods and practice of teaching aim to provide students with opportunities to learn differently from traditional approaches of teaching by transmission which is still present in some parts of schooling today. More than ever, building knowledge collaboratively by students should be an essential part of educating the young to become actively involved in their own learning (Tan, Hung and Scardamalia, 2006[46]).

Two pedagogical features that can help students learn actively through deep engagement in various tangible and intangible learning spaces are teacher-guided learning and experiential learning. We do not present them as two distinct pedagogies because these features and pedagogical principles frequently overlap and co-occur in the methods that teachers employ for designing learning. For example, teachers can construct activities that closely guide students in their discovery and learning of curricular content while at the same time immersing them in environments to experience different aspects of this content. The same is true when teachers set out to design experiential learning by putting students in physical spaces to experience the reality of some knowledge to be built. This is done using carefully constructed activities that are often teacher guided, offering the necessary support for learning to take place. The objective for learning through these methods is the same, that is for learners to engage with their learning actively in the process of arriving at new knowledge, understanding, skills, attitudes and beliefs intended. Teacher-guided learning and experiential learning are not independent of one another. Rather, it is often a combination of these two features in teaching that engenders active learning processes that can take students away from passive retention of pre-selected knowledge or syllabus items.

Effective pedagogies balance teacher guidance and experiential learning, recognising both the social nature of learning and the individual cognitive capacities of students. Students learn by engaging with peers and teachers while also drawing on their own metacognitive abilities—the capacity to reflect on, regulate, and strategize their learning. Highlighting metacognition complements socially based approaches by emphasising individual agency in learning. Together, social interaction and metacognitive engagement

create the conditions necessary for active learning and the development of education for human flourishing competencies. By integrating two perspectives on learning – learning as a social phenomenon (social and cultural conditions) and learning as an individual cognitive enterprise (mental processes), we emphasize the learning process as an interaction between the learning environment with many of its actors and conditions and individual thinking. Learning is seen here as an active, strategic and constructive process, is guided by learners' introspective awareness and control of mental processes, and at the same time facilitated by social, collaborative settings that value self-directed student dialogue (Bruer, 1998[47]).

Harnessing learners' metacognition will develop intra-personal knowledge and skills to support their learning and strengthen students' personal agency for learning. This is manifested in making choices about the action to be performed (intentionality), anticipating future events and outcomes (forethought), monitoring, regulating and directing one's behaviour (self-reactiveness), as well as examining and evaluating one's actions and thoughts (self-reflectiveness) (Bandura, 2001[48]). The designing of learning of human flourishing competencies engage not only knowledge and understanding, but also personal attitudes and beliefs, and needs an approach that combines the social and cognitive roles of learning. This twin perspective of learning underscores the point that competencies for human flourishing cannot be developed through traditional ways of teaching as a transaction or transmission process. Instead, we should recognise young people's capacity for understanding change and being motivated to be part of that change, and engage them actively in transforming their own learning.

Teacher-guided learning

Teacher guidance as a teaching strategy is important for enacting the process of scaffolding of learning. Scaffolding is a strategy by which teachers provide helping activities to enable learners to accomplish a task which they would otherwise be unable to accomplish on their own (Bruner, 1966[49]). The process of scaffolding is principled on the concept of Zone of Proximal Development put forward by Vygotsky (1962[41]) which focuses on a gap that learners have in attaining a learning goal and which knowledgeable others such as adults or teachers can help them to bridge. It offers the necessary support and guidance for students as they work on a task and leads them to successful completion of the task. While the outcome is important, for example, getting an accurate understanding of a concept in a subject such as Science, the process of arriving at that understanding is equally if not more important.

When learners are asked to work on a task on their own or with a group of peers, they will draw on their existing knowledge and skills which are limited, thereby constraining their ability to attain a desired outcome. Moreover, they are likely to focus only on aspects of the task that they find easy to tackle and may therefore overlook other aspects of a complex task that they do not feel sufficiently competent to handle. Scaffolding activities bring learners closer to a state where they can eventually do the task well without teachers' help (Maybin, Mercer and Steirer, 1992[50]). Teachers can guide students towards this goal by assisting learners with pre-task planning and breaking down a task into smaller manageable parts. This is further enhanced by teachers' role-modelling, prompts or input. Bridging this gap with the teachers' guidance is an active learning process. It not only creates opportunities for deeper engagement with learning but also develops greater confidence amongst students in managing tasks that initially appear challenging. It enables students to acquire new knowledge and competencies which they will not have achieved on their own.

Teachers can plan the kind of support to give to students by taking reference from the revised Bloom's Taxonomy, which offers a classification of the types of knowledge and cognitive processes students use to learn (Anderson and Krathwohl, 2001[51]). Guidance given to achieve outcomes for a range of tasks will help students learn actively to engage with the more complex cognitive processes such as evaluating and creating, while building a knowledge base that begins with, but is not limited to, factual knowledge. Over

time, teachers can gradually withdraw close guidance for similar kinds of tasks, thus allowing students to develop autonomy in approaching a task and gaining confidence from their ability to tackle them.

Implications for developing human flourishing competencies

Although teacher-guided learning is popular for helping students discover 'fixed' knowledge that is amenable to abstraction (Margunayasa et al., 2019[52]), it need not be limited to only such kinds of knowledge. To acquire knowledge in the humanities about life and living and develop practical wisdom (phronesis), students will benefit from teacher guidance enacted in ways that are appropriate for subjects of this nature. Unlike the learning of scientific concepts, however, in the learning of phronesis, there is generally no one precise response required in guided inquiry and discovery. Knowledge which is open to subjective interpretation will require different considerations for the outcomes and conclusions they target. Interpretations of what the flourishing life constitutes require cultural contextualisation and sensitivity; taking action in the world is not reducible to a fixed agenda for all, for instance.

Unlike in the STEM disciplines, learning outcomes in the humanities tend to be more open-ended and accommodate divergent thinking. The procedure used in guiding inquiry and discovery is nevertheless similar and relies on the teacher designing questions, prompts and activities that will lead students to examine an issue in a systematic manner. Teacher-guided learning for developing human flourishing competencies such as adaptive problem-solving and ethical competence should recognize such outcomes. The emphasis is as much on the process of inquiry and discovery as it is on the outcome. In fact, in developing competencies that continue to evolve and are refined by new experiences, one would expect students to continue to examine their own understanding and attitude as they address complex issues about life and living.

Teachers' role in developing education for human flourishing competences should be as an authoritative (not authoritarian) guide that embodies the forms of wisdom that are required to model lives of human flourishing. For instance, how one is supposed to understand the world is not by any means finalised—scientific knowledge is continually revised, and our understanding of collective means to achieve flourishing as societies evolves as human preferences change. Teacher wisdom is particularly important to the flourishing project; the competences require finesse in its application to the diverse possible contexts of its application. While educating for the 'right answer' provides opportunities for standardisation, measurement, and equitable achievement, such an approach might be corrosive to a longer-term quest for accuracy given the sensitivity of issues such as ethical decision making to the particularities of the case at hand.

Experiential learning

Experiential learning is often attributed to the constructivist theory of learning attributed to Lev Vygotsky (1978[40]) and underscores the importance of experience for constructing new knowledge. These ideas can also be traced back to the influence of educational thinkers, Dewey being one as highlighted at the beginning of the chapter. The experiential learning approach is sometimes presented rather simplistically as learning by doing things or learning through participating in hands-on and other physical activities. While these are important elements of the approach, there is more to experiential learning because experience is multi-faceted. The way learners engage with different types of experience in diverse learning environments has a significant part to play in their education. It is important to recognise that in experiential learning, the learners are not merely participants in an experience or a situation that they can interact with to create learning outcomes. Rather, they are agents in a process of a continuous cycle of inquiry, reflection, analysis and synthesis (Bartle, 2015[53]).

Kolb's (1984[54]) influential conception of experiential learning defined it as "the process whereby knowledge is created through the transformation of experience. (p.38)", referencing a remark by Jerome Bruner: "Knowledge is a process, not a product". Kolb's concise definition belies the complexities of the learning process that he has articulated, a process that combines experience, perception, cognition and behaviour. Drawing on the work of John Dewey, Kurt Lewin and Jean Piaget, he identified four modes of learning that require corresponding types of abilities which can also be developed in what he called a "tension- and conflict-filled process" (p. 30). Through these modes and skills, learners will transform their experience to create new knowledge as they move "from actor to observer, and from specific involvement to general analytic detachment" (p.31). The four modes and abilities are:

- Concrete experience: be involved fully, openly, and without bias in new experiences.
- Reflective observation: reflect on and observe experiences from many perspectives.
- Abstract conceptualisation: create concepts that integrate observations into logically sound theories.
- Active experimentation: use these theories to make decisions and solve problems.
- There are four critical aspects of experiential learning:
- An emphasis on the process of adaptation and learning as opposed to content and outcomes.
- Knowledge is a transformation process, being continuously created and recreated, not an independent entity to be acquired transmitted.
- Learning transforms experience in both its objective and subjective forms.
- To understand learning, we must understand the nature of knowledge, and vice versa.

Kolb's idea of experience is closely related to Dewey's conception of experience and learning environments, which are diverse. In our earlier discussion of learning environments, we have proposed that learning environments for human flourishing can be found in seven tangible and intangible spaces: the curriculum space, pedagogical space, aesthetic space, social-emotional space, exploration and imaginative space, virtual space and physical space. In experiential learning, these spaces offer many opportunities for interactions between learners and the people and elements in these spaces. Such interactions can lead to adaptation and evaluation where knowledge is continuously created and recreated, and experience is transformed through new environments.

Implications for developing human flourishing competencies

Learning is an interplay of personal and environmental factors A socio-cognitive view of learning recognises that learners are both members of communities such as the classroom and the school they belong to as well as unique individuals who engage with their learning on their own. Experiential learning offers students opportunities to engage with knowledge and issues in their world through a cycle of inquiry, reflection, analysis and synthesis. In these last two stages, students use their inquiry outcomes and personal introspection of their new experiences to build new knowledge and draw conclusions and generalisations. When they must produce these outcomes, students (with teacher guidance) can transcend boundaries of learning that are constrained by the norms of established disciplinary knowledge to new perspectives that combines the lenses of various disciplines. In doing this, they learn skills to understand their world by attempting to reconcile different views and recognising tensions that invariably exist.

Experiential learning that adheres to Kolb's four modes of learning moves students from being actors to observers, and from personal involvement to analytical detachment. Such strategies are necessary for helping students construct knowledge that is subjective and interpretive and contributes to the growth of practical wisdom or phronesis. For example, to nurture ethical competence, teachers can create situations

for students to derive interpretations of a phenomenon being examined and apply ethical principles to draw generalisations or conclusions. Similarly, adaptive problem-solving will require creativity in analysing new problems through different lenses acquired through experience or provided by the teacher. Students can then attempt to construct solutions that are deemed plausible or do-able in new situations found through these new experiences and knowledge.

Appreciation of the world, particularly aesthetic perception of appreciation of the sublime, similarly requires methods of teaching that offer experiential learning with teacher guidance. In fact, the nurturing of this competency is probably the hardest because in schools, students typically do not spend enough time observing and capturing the beauty around them – to stop and smell the flowers as it were, because of pressures from academic studies and examinations. To develop this competency, students will require close guidance from teachers and engage with carefully designed learning experiences and novel activities. It will also involve individual reflection that is supported by the teacher who is more knowledgeable and triggered by immersive experiences in diverse learning spaces where they encounter beauty and wonder. This task may call for the support of teachers of visual and performing arts in the schools who can lend their expertise to a job that some teachers may not be well equipped to do. Similarly, learning to express oneself in the world needs to be done in the context of different situations or scenarios and supported by teacher scaffolding.

Activities and tools for teacher-guided and experiential learning

Teacher guided learning and learning by experience are more established in the domain of STEM largely because of the way knowledge is structured and the established procedures for many educators to use for guiding inquiry and discovery amongst their learners. Guided inquiry, for example, benefits the learning of scientific knowledge and is important for helping teachers identify their students' conceptual misunderstandings which they can subsequently address (Kasmiana, Yusrizal and Syukri, 2020[55]). Competencies for flourishing such as ethical competence, understanding the world and acting in the world, however, largely fall within the realm of the humanities. Adaptive problem-solving straddles across the two domains. Nevertheless, the procedures and processes used for guided discovery in STEM subjects can be a starting point for adapting activities for human flourishing competencies.

More thought is needed on how teachers can promote active learning strategies for acquiring open-ended forms of knowledge, such as phronesis. Human wisdom is needed for making ethical decisions and it can also be brought to bear on how one develops compassion toward others as well as acknowledging different worldviews. This may be acquired through apprenticeship and role-modelling. At the level of school systems, accountability to the system often requires an approach to education that can result in point-at-able changes in measurable quantities. While we are sympathetic to these demands, we are equally concerned about the potential for rational actors within school systems to generate less rational outcomes such as teaching to the test or misrepresenting the nature of human flourishing competences and related areas of knowledges. We suggest further deliberation on these issues due to the contextual sensitivity of these competences.

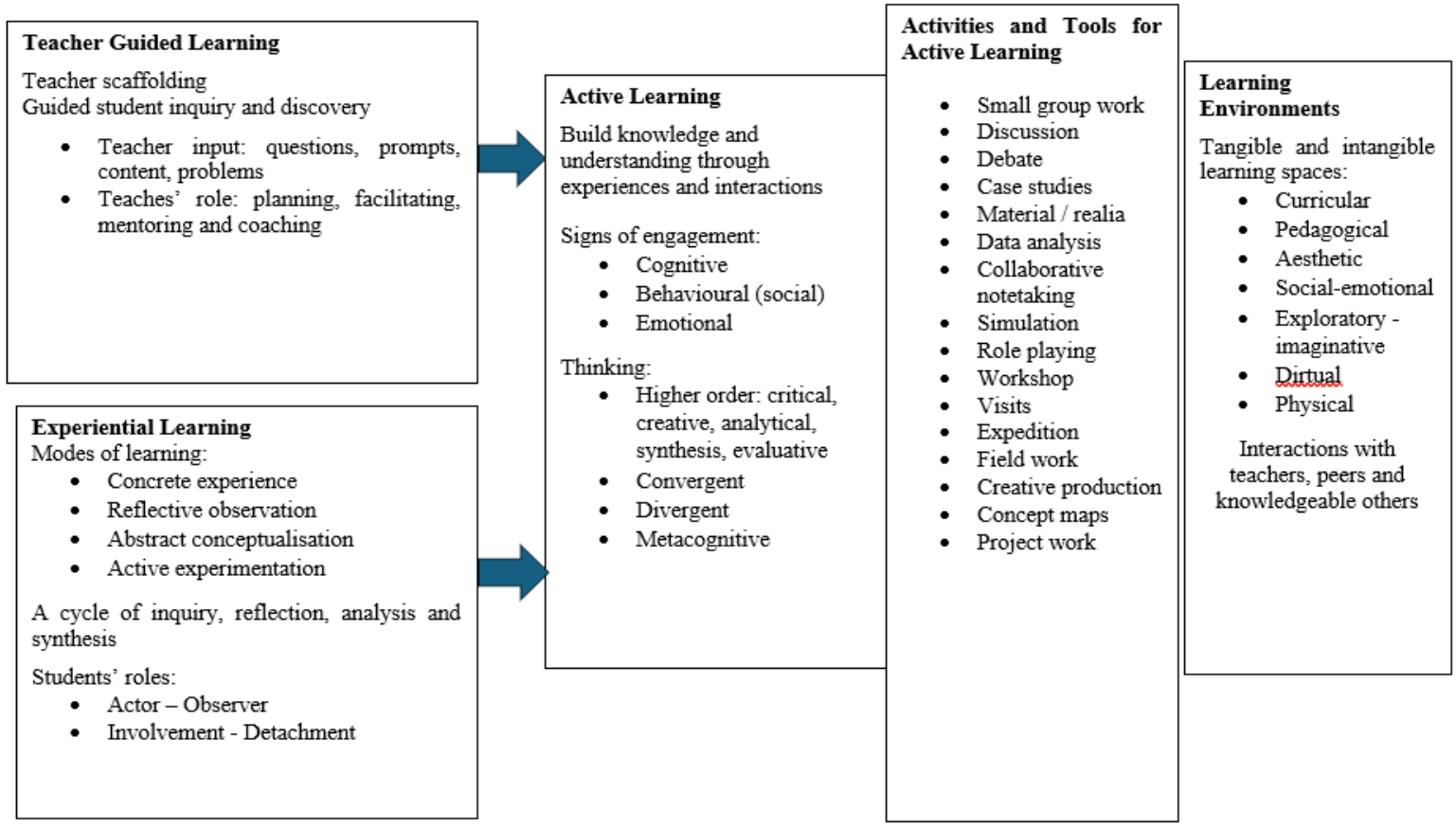
Another aspect of active learning is the extent to which individual learners can engage meaningfully in understanding their own learning processes through their metacognition. Students can be guided in how to assess their person knowledge about their human flourishing competencies. They can consider their self-concept and beliefs and discover ways of approaching the respective tasks that promote one or more of the five competencies. Understanding their own aesthetic appreciation and responses to the sublime will also benefit from a raising of their metacognitive awareness about how and why they respond in a particular way. It is not within the scope of this chapter to go further into the concept of metacognition. It is

useful, however, to recognise its importance in future explorations of approaches for promoting active learning.

Teachers concerned with developing human flourishing competencies can use various active learning activities and tools. These include providing learners with data to work with, prompts for assessing own understanding, setting up of dedicated spaces for learning, role playing, simulations, workshops outside of schools, games, reflection instruments, concept maps, collaborative notetaking, case studies, expeditions and visits. Small group work, creative activities for discussions, frequent questions and evaluation, as well as specially designed materials can help students develop critical thinking skills (Bean, 2011[56]; Browne and Freeman, 2000[57]), stimulate thinking and enhance decision making ability, problem-solving skills, and innovation (Burbach, Matkin and Fritz, 2004[58]).

Case studies are popular amongst older students. When case studies are used, students apply their content knowledge to various scenarios and share insights in discussion groups. For collaborative notetaking, students consolidate their notes on topics learnt and then exchange these ideas with their classmates, as well as highlighting key ideas that the student may have misunderstood (Harvard University, 2024[59]). Active learning is also found in project-based learning. In project work, there is a strong emphasis on the production of an outcome by students working in groups addressing authentic challenges they have identified (Larmer, Mergendoller and Boss, 2015[60]). Older students can exercise a great deal of autonomy while younger students will require close guidance and monitoring by teachers. See **Figure 4.2** for a summary of the key characteristics of the pedagogical considerations for active learning.

Figure 4.2. Active learning through teacher guided and experiential learning methods



Technology-enabled pedagogies for active learning

In Part 1 we discussed the benefits and issues with the use of technology in education and suggested what an educational response ought to be for nurturing human flourishing. We put forward that technology is not neutral; it is a tool for amplifying human intentions, the intentions of the ones who developed the technology or who found a use for it. This amplification of intentions can have a positive and negative impact on societal outcomes. Given the ubiquity of technological tools such as smart phones in our society today, using technology to enhance teaching can only bring more authenticity to the learning experiences of students who are immersed in it outside the classrooms. Technology can create new dimensions of learning experience that would otherwise be lacking. It can be deployed to support cognitive enterprises such as reflection, analysis and decision making, and help focus attention on the beauty existing in different forms in the environment.

At the National Institute of Education Singapore, faculty members are expected to model innovative pedagogies for all student teachers in their initial teacher education programmes as well as in-service teachers on professional development programmes. Students on these programmes learn experientially what active learning is when using technology and how technology influences their own knowledge, skills and understanding. They also have opportunities to appreciate the usefulness of these pedagogies while reflecting on, critiquing and adapting them for use with students in schools. Examples of these innovative pedagogies with technology are given in the table below**.** Collectively, they demonstrate features of teacher guidance and experiential learning embedded in the teaching methods employed.

Table 4.2. Examples of teaching methods and tools for technology-enabled/ enhanced learning

	TEL tools and pedagogies	Benefits (Students' perspective)	Benefits (Course tutors' perspective)	Implications for education for human flourishing competencies
1	Mobile and Web-based feedback system to assess students' content awareness and learning experience	Express own assessment of understanding and learning Convey feedback to tutors for refinement of teaching.	Receive feedback on teachers' understanding and provide guidance to ensure learning is on track and queries are promptly addressed.	Teachers' abilities to monitor student learning are amplified with these systems. The creation and maintenance of a digital space affords continual learning of principles in relation to a wide variety of experiences that students will encounter.
2	Internet of Things (IoT)	Learn how to use real-time data from sensors and other tools Use data available for teacher-guided inquiry.	Design interactive learning by tapping data for multiple purposes	Learning to understand the world through the presence of distributed sensors provides another dimension of appreciation. The barriers to acting on the world can be slightly lowered for virtual space.
3	Virtual Reality (VR) and Augmented Reality (AR) to teach topics in subjects, e.g. Geography, Chemistry	Experience immersive and interactive simulations in different virtual environments to learn better and recall learning	Change the way of online learning to create greater interest and understanding	Appreciation of the world is improved by having 'trained eyes'; the ocular focus of these technologies helps students 'see' what they might otherwise miss
4	Natural Language Processing to analyse chat data by student groups and provide visualisation of data.	Using data as behavioural evidence to reflect on teamwork and set targets for personal improvement.	Provide students with personal data for self-inquiry, analysis and evaluation to make their learning engaging	Teachers seeking to summarize large amounts of data for sentiment analysis in ethical deliberations can be aided by these technologies.
5	AI companion to help teachers with ensuring laboratory safety and warned of safety violations	Pose queries on laboratory safety practices and receive answers An aid to assist behaviour management.	Test it as a trustworthy AI companion for scaling up to other groups	Educating for student autonomy in conditions that can be borderline unsafe—having automated systems can reduce the workload on teachers.

6	Design blended instructional packages with multimedia function for inquiry-based learning for diverse audience	Learn interactively in virtual and physical environments and consider adaptations for different kinds of learners	Provide guidance on inquiry activities online to show its potential for mainstream and special needs students in schools	Adaptive problem-solving can be enhanced with multiple representations of the problem.
7	Music mobile app for self-diagnosis	Become aware of their own learning gaps and learn musical elements through interactive activities	Co-teaching with the tutor	Capitalising on the virtual space to build student autonomy in distributed learning settings
8	Authentic videos to provide scenarios for inquiry and problem-solving.	Question, reflect, and analyse practices together	Provide authenticity in learning with multimodal tools	Multiple representations aid in appreciating the world
9	Location-based mobile app to capture and share geographical data collected at different locations	Work with a large group to construct understanding in a through tagging data on maps and group inquiry.	Create an immersive authentic environment for a subject like geography	Making use of a virtual 'layer' superimposed on the world to increase appreciation of the world.
10	Drones and 3D apps to help analyse sports performance	Analyse and assess own performance	Provide learners with real-time data beyond what the human eyes can capture.	Enlarging the available perspective to learners encourages them to see the world in a different way.

Note: These examples are selected from the NIE publication 'Learning @NIE' (2017 – 2024).

Today, technology in the form of AI has become an important resource for teachers and learners. For teachers AI can replace some aspects of their work that are repetitive or formulaic, thus leaving them to focus on more humanising and creative parts of the jobs. For students, AI has the potential to help them learn at their own pace and provide a companion who can clarify their understanding and provide them with interesting activities to be engaged. A point worth repeating here is that teachers must exercise care when using technology for teaching. Simply because a particular technology has found use in other sectors of society there is no guarantee of its applicability to the educational context. There are normative considerations that are uniquely educational that are not reducible to typical success criteria.

Technologies that teachers choose to use must be subject to the same psychological, cultural and ethical scrutiny as large-scale technological platforms and tools which have repeatedly been called to account by society. When using technology educators must ask questions such as: Whose intentions is this tool amplifying and for what purpose? What is the impact? Should I as an educator for human flourishing welcome it? How does it help my students be involved cognitively, behaviourally and emotionally in their learning? Are there skills that they will not be using or may lose for lack of use? What might be side effects of this technology, and are these side effects worth the main effect? For instance, having all students possessing their own computing equipment may enlarge access; but a side effect may be the increase in distraction and off-task behaviours for which teachers now must find ways to manage.

An exemplar of developing flourishing competencies with technology

Technology can be leveraged for supporting students' active learning through teacher guided activities and immersive learning experience. This is illustrated in an NIE project entitled the Knowledge Building Design Studio (KBDS) project (Knowledge Building Design Studio, n.d.[61]). KBDS is a learning science project that uses multi-modal learning analytics (MMLA), AI and ICT to help students collaborate, learn disciplinary knowledge and acquire 21st Century Competencies and habits of mind. It demonstrates the potential for technology to develop education for human flourishing competencies that have both domain- specific and domain-free elements. Led by Dr Teo Chew Lee and colleagues (Teo et al., 2022[62]; Yuan et al., 2023[63]), the project exploits digital technology to facilitate learning and generate real-time learner data of collaborative learning. It uses the Knowledge Forum (KF), an online discourse space specifically designed to support knowledge building. There are four components of the MMLA generated: videos of student

collaborations, transcripts that capture students' verbal and textual contributions, graphic outputs on pose, verbal and KF posts, and selection of specific instances of the discussion from the outputs.

The project that began in 2019 brings together researchers, schools, teachers and students on a regular basis to generate and improve idea-centric practice and research. Technology is used here to amplify student discussions, reasoning and interactions. The core activities are discussion groups where students engage in sustained inquiry and discussions to share ideas, suggest resources for peers and collectively formulate new understanding and construct knowledge. As teachers are involved, the project also improves teacher capacities to facilitate idea-centric practices. Knowledge Building Learning Analytics based on real-time data of students' discussions are used to support reflections by students and teachers, each according to their respective learning objectives. New ICT infrastructures have also been developed so that teachers can easily access and use research evidence. Through partnerships between researchers and teachers, teachers themselves acquire new knowledge and tools to create better learning environments and experiences for students.

Implications for developing competencies for human flourishing

The various TEL methods presented in the above table give us a sample of the ways in which technologies can be used to help students learn. The KBDS shows the potential for nurturing human flourishing competencies in a combination of tangible and intangible learning spaces. Students can be engaged in face-to-face discussions in the same room, or they can be engaging with other students online in another school or classroom. By setting relevant tasks and topics, teachers can leverage such a platform to develop any of the five competencies. Students' speech and behaviours are recorded, providing useful data for analysis for various purposes. The KBDS in NIE showed that the students learn through immersive experience and are guided by knowledgeable others such as teachers and NIE researchers who designed the engaging tasks they do. In their discussions they engage with both subject domain-specific and nondomain specific topics that enable them to engage with one another in the exploration and imagination space. These discussions can lend themselves to a wide variety of topics that involve problem-solving and decision-making.

The experiences of participating in the discussions develop the students' competencies for acting in the world by expressing themselves to the world. They also begin to experience what it is like to interpret the world, albeit a limited one, by understanding other people's perspectives. Such kinds of platforms and group activities can be a launchpad for inquiring into many concrete and abstract issues about the world. Such a pedagogical approach when used with older students and those in universities and colleges have immense potential for developing the cognitive and social competencies in interpreting and appreciating the world. The digital space overlaps with the students' social-emotional space to enhance self-awareness and reflection. This enables students to practise their skills, explore their understanding and examine their assumptions individually or with another. Technology in the recent decade has become an important platform for individuals expressing themselves in the world through spoken and written words, art, design and other creative endeavours.

Technology can contribute to young people's learning not only as a way of amplifying their cognition, but the use of technology itself can also be an object of examination. To help students flourish in this age of accelerated technological development and use, they must also learn about technology. Problem-solving, ethical reasoning as well as interpreting and appreciating the world must include an interrogation of technology that is hidden in plain sight in our lives today. Young people must therefore develop a critical understanding of what technology does and how it is affecting their lives and the lives of everyone in the world. They should also learn to have opinions about such issues and express them.

Contemporary technologies have developed amazing abilities to emulate human abilities and, in some ways, transcend it. In having teachers and students prepare for lives for human flourishing it can be tempting to advocate the use of technology to increase efficiencies and to enhance effectiveness. Yet, as the history of technics has shown, every technical invention is a pharmakon—simultaneously remedy and poison (Stiegler, 2009). Just as every drug must be administered by a trained professional, according to a prescription, every technological deployment such as AI in education must be supervised by an educator with an intention to care for the outcome of such use.

Learning to flourish in the makerspace

In this final section we provide an exemplar of a learning environment of overlapping tangible and intangible spaces where competencies for human flourishing can be nurtured. The makerspace is used here to show the teaching of adaptive problem-solving amongst other competencies. Table 4.3 shows how the three themes introduced in Part 1 influence the makerspace as a site for developing human flourishing competencies.

In adaptive problem-solving, disciplinary forms of knowing are central to the acquisition of adaptive expertise. Acquiring basic expertise in sophisticated disciplinary knowledge already seems difficult enough. Achieving adaptive expertise requires the acquisition of creativity adjacent skills and dispositions. Educators must communicate the epistemic dimensions of disciplinary knowledge, to 'open up the box' of disciplinary constraints and encourage students' ownership of the means of production of new knowledge and new applications into other contexts. However, creative ventures often pose risks in that if teachers seek to guarantee outcomes, the potential for creativity becomes minimised if not eliminated entirely. In recent times, STEM lessons in schools often rely on construction tasks that are directed by a creative problem-solving approach such as design. In many schools, the makerspace has been identified as the site for STEM education.

Table 4.3. The makerspace as a site for developing competencies for human flourishing

	The Makerspace
Disciplinary concerns	In makerspaces, the disciplinary bases of S/T/E/M knowledges come with various degrees of epistemic certainty. Teachers who wish to undertake this venture must be aware of what knowledge is open to contention and what is not.
Education to develop autonomy	The prime purpose of makerspaces is to develop students' creativity. True creativity is not possible unless students are given the opportunity to develop their own initiative, their intention of what ought to be made real.
Critical approach to technology	Makerspaces are concerned with teaching students how to 'dismantle' artefacts and to reassemble them to achieve their own intentions, along the way becoming critical about how technologies are deployed for social good.

Considered as a junior engineering workshop for school children, makerspaces are typically equipped with tools and materials to make artefacts of medium intricacy. In the last decade, the ubiquity of digital fabrication tools has been a feature of makerspaces. Along with these devices, the availability of inexpensive miniature programmable controllers has also coincided with the boom in interest in programming. All these conditions have given rise to STEM as a school activity that can attend to at least two competencies – adaptive problem-solving and ethical competence.

In confronting the chaotic nature of materials, failure can be quite common. While such failures typically result in a loss of confidence in teachers, makerspaces instead normalise these forms of failure and use these episodes as opportunities for both teachers and students to learn together. Here, education is not conceived as an act of communication, of transmitting valued knowledge and skills, but instead is the work that needs to be done to bring about changes in the manner of *being*. To be sure, we do not necessarily

advocate such a pedagogical orientation as a universal solution for all instructional challenges, but largely for adaptive problem-solving, and similar situations such as creative problem-solving or other settings where student autonomy is either the desired outcome or a contributory goal.

Summary

In Part 2 of this chapter, we examined what active learning entails and proposed pedagogical considerations for promoting active learning in general and the learning of competencies for human flourishing in particular. Teacher-guided learning was proposed as a means of supporting learning through scaffolding that bridges the gap between what students can do independently and what they can achieve with guidance. It is also a means to lead students' inquiry into domain- specific knowledge. Experiential learning was also proposed as it enables students to be immersed in various learning spaces beyond the physical to engage with learning in different modalities and applying different senses. The role and use of technology are discussed and illustrated with some proven best practices that have implications for developing competencies for human flourishing. Finally, the use of makerspaces provided an exemplar for how a distinct competency such as adaptive problem-solving can be nurtured.

Conclusion

The themes of educating for flourishing and pedagogical orientations in this chapter are not intended to be prescriptive. They are, nevertheless, an invitation for educators to remember the full range of educational outcomes that ought to be available in school settings, and to develop the kinds of wise decision that will help us guide and nurture young people in individual flourishing and the flourishing of others. Wisdom and discernment in the deployment of pedagogical repertoires are just as important to develop in all educators, and this is one more metaphorical arrow to the quiver.

In our discussion of learning environments and pedagogies for active learning, the teachers' role has been implicit. It is fitting to end this chapter by refocusing the discourse on education for human flourishing on the teacher. The teacher has a far bigger role beyond planning and executing lessons for active learning. Teachers are domain experts, designers of learning, guides, facilitators, motivators, coaches, mentors and role models. Their overarching role must be to nurture purpose-driven individuals who can lead productive lives and care for the common good of society (Heng, 2024[64]) by helping to make the school "a window to students' social awareness and ethical action", and "a mirror for their self-awareness" (p. 146[64]). These metaphors of a window and a mirror are especially important when we consider what it means to help students flourish through their education and how the distinct competencies of acting in the world, understanding the world and appreciating the world can contribute to a life that is meaningful and fulfilling. To nurture these competencies, we need teachers who are not only pedagogically skilful but who also believe in nurturing students to work towards the greater good beyond themselves. Their students will be inspired to use their knowledge and skills to solve problems for humankind, think ethically, ask questions to understand the world, appreciate its beauty and diverse worldviews and leave their own mark of thinking through expressing themselves through all five competencies.

The project *of Education for Human Flourishing*, in many ways, invites educators around the world to rethink the goals of an education worth giving to our young. As education is always normatively oriented towards the achievement of excellent lives, and the substance of such excellence will perhaps be forever an open question, it should not surprise policy makers and educators alike that regular efforts to rethink and redefine education is a feature of our work. Also, just as "the medium is the message", the pedagogical question of how one ought to educate, significantly influences what students will take away from the educational interaction. It may be useful not to think about schooling as only a means of preparation for

future lives of flourishing, but to provide opportunities for flourishing in students' lives as they go through schools. Doing so will require educators to think past the limitations that we have placed for ourselves on our taken-for-granted ideas of what schools can be, to now think about what schools ought to be as environments for flourishing. We celebrate the ambition of this project and invite educators around the world to join in this vital conversation in reimagination.

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5 Leaders and teachers: Towards an education work force dedicated to human flourishing

Introduction

The purpose of this paper is to offer a draft framework to support a systemic approach to the professional development of leaders and teachers in K-12 education if education is to reframe its purpose in light of the challenges humanity faces. This is a transformational agenda. An alignment of forces, ranging from OECD itself to the UN and World Economic Forum now exists, united in a view of the new direction of travel. OECD pioneered work in this space with its Education and Skills 2030 project. The UN convened a summit on the *Transformation of Education* in 2022.

Chapter 1 of this paper sets out the foundational arguments for a reframed purpose, and the consequences of that. It suggests that the new purpose should be:

> *to nurture, in all of us, a suite of distinctive human capacities, that equip us not only to flourish as individuals but contribute to flourishing societies and economies, in harmony with the planet.*

The transformation that is required is already underway. It is happening in pockets, projects and prototypes that are being developed in many parts of the world by visionary educators (Hannon, 2022[1]; Schleicher, 2018[2]). Transformation must necessarily be an evolutionary rather than a revolutionary process. Many steps are needed to progress this evolution, not least the societal reconsideration of education's purpose. However, without a simultaneous re-skilling of educational capacity – its leadership and extended workforce – the project is doomed to failure. This is a failure humanity cannot afford.

The professional development of educators is therefore of the utmost importance, as every high performing system has known. Much in current practice around teacher- and leadership learning remains relevant and valuable. It has many strengths. It is important that those strengths are not lost; but also that we acknowledge frankly some weaknesses. Therefore, the focus here is on how existing professional development frameworks might be further redesigned or extended if the ambitious goal of supporting human flourishing is to be met.

The basis for the proposals set out in this paper rests on a number of foundations:

- The assumptions that underpin the work of HPST2, in particular the vision entailed in the idea of Education for Human Flourishing (EHF). This contains ideas both about the new competencies learners will need if human flourishing is to be achieved in the dark and challenging circumstances humanity currently faces. And it has implications too for the nature of systems (and therefore the leadership) that can promote such competencies

- A mapping exercise of a sample of the most forward-thinking professional frameworks currently in operation
- Thought leadership in this space that points to the implications for teacher and leadership learning.
- The first of these points centres on the proposal for a distinctive set of competences for learners if the goal of human flourishing is to be realised. It follows then that both teachers and leaders must not only understand these competencies but also, to some extent, model them themselves. As remarked previously, teachers, as qualified adults in society, must have some insight on flourishing and must possess some practical wisdom about how to live in the world.

To recap, the competencies identified are:

- ***Adaptive problem solving:*** applying what has been learned in one context to another, drawing on higher-order thinking and decision-making skills
- ***Ethical reasoning*****:** balancing one's needs and wants with those of other people, species and the planet
- ***Understanding the world*****:** competency in understanding and respecting competing worldviews, and synthesising them into an integrated outlook
- ***Appreciating the world*****:** recognising and creating beauty, apprehending the sublime and the transcendent
- ***Acting in the world*****:** developing and deploying agency to make a difference to the world.

These ideas therefore must guide thinking about the new competencies entailed for leaders and teachers. However, they do not map directly. Rather the question must be: what are the specific competencies professionals need to deploy to create the kinds of environments and experiences that enable the development of young people in this direction? The qualities of such environments and the pedagogical concomitants have been set out in the previous chapter. This chapter develops those ideas into a synthesised framework for the professional development of a workforce that could realise education's new purpose.

Frameworks for professional development

Educators committed to developing education for human flourishing have not waited for policy makers to catch up. Globally we see initiatives in clusters, networks and sometimes individual entrepreneurial schools modelling the change, and becoming the change. Their work is inspirational, and the testimonies of their young graduates is building a growing evidence of the power of the new curricula, pedagogies and assessment methods under development. Whilst these approaches are becoming codified, it must be recognised that the evaluative challenge is considerable. Education for human flourishing entails 'head, heart and hand'; and this is much more complex to evidence than the (apparent) simplicity of measurement by standardised tests. Going hand-in-hand with the evolution of practice is the learning happening amongst the practitioners. This is reflective practice or praxis. Enough experience is now available to indicate the direction in which professional educators' learning and development (PD) needs to move to achieve the new goals.

It may be worth noting here the confusing use of terminologies in this field. The terms 'capabilities', 'aptitudes', 'competencies', 'skills' are often used interchangeably and inconsistently. In this paper the term 'competency' will be used as the key construct, since it has been rigorously explored and utilised in the predecessor OECD project Education and Skills 2030 (OECD, 2005[3]). The term 'competency' denotes the combination of knowledge, skills, values and attitudes considered to be of value in a particular domain. It overcomes the unhelpful and false dichotomy between knowledge vs skills, recognising the relevance of both and their inherent connection. And it acknowledges the importance of including values and attitudes

as an important part of the piece. In what follows therefore, the term ‘competency’ will be deployed as the key construct; but it is beyond the scope of this paper to develop in detail the constituent knowledge, skills, values and attitudes that would constitute the whole.

Moreover, it is recognised that the wider educational workforce (including learning mentors, specially trained classroom support workers and a whole range of allied professionals) is an absolutely vital component of high performing systems. Whilst it is beyond the scope of this paper to explore the implications of the arguments presented here, the direction of travel following on from this focus on leadership and teachers will be apparent.

Professional learning for leaders: the challenge

As numerous publications have pointed out, the task of education leadership has never been more important or challenging.[1] Leaders must grapple with the legacy of health-related disruption; unacceptable and unsustainable growth in inequality across and within nations; mental health problems amongst learners and teachers; and leadership burnout. In many jurisdictions, the recruitment to the role of School Principal has become problematic, as teachers baulk at the magnitude of the task. This makes it all the more imperative that preparation for, and development within, the role becomes more authentic and constant.

Part of that is the acknowledgment that the job has changed. There has been a marked trend to see Principals as a key contributor to system leadership: whether that be directly in the form of federations of schools or multi-academy trusts (such as in the UK); or in broader consultative and engaged roles within district initiatives (such as in districts like British Columbia and Kentucky). This role is focused on contributing to the direction of travel of the system as a whole. This paper incorporates considerations of both institutional and system leadership (roles which are sometimes vested in the same individual).

In relation to systems, the work of the EHF project suggests that systems that are moving towards ‘human flourishing’ need now to embrace at their core some new features. Discussed more fully in the next chapter, these are:

- Equity
- AI enabled and aware
- Ecosystemic.

The implications of these dynamics are explored below. However, since they are clearly not features typically to be found in current systems, we are looking at a considerable task of system change, not simply that of system maintenance. This consideration informs the emphasis placed below on systems thinking; and is informed by recent work on change in complex systems[2].

Similarly, at the school/institutional level, the leadership challenge is now one of a different order to that faced by previous generations of leaders. We now need institutions that actively contribute to the furtherance and development of key goals: rules-based democracies, based on the values of universal human rights and equity. But democracy is in need of renewal: perhaps it has always been so (though heretofore, schools have not seen this as part of their business). However now, in an AI world that threatens the apprehension of truth and highlights the fragility of democracy, schools as critical social institutions have a key role to play in the furtherance of this aspect of human flourishing. Partly this is to be done by creating the optimal conditions for a workforce to address the competencies young people need for human flourishing. But is also, to an extent, a community leadership role: one which conceives of schools as parts of a wider ecosystem.

With these considerations in mind therefore, the following set of competencies is proposed as the basis for a renewed framework for educational leadership. Their choice reflects the current state of thought leadership in this space (Hannon and Mackay, 2023[4]), but the framing ultimately must stand or fall by the degree to which they respond to the overarching imperative: a new reorientation towards a paradigm founded on the idea of flourishing, rather than old concepts of 'success'.

Re-boot educational purpose through narrative

The 'leader as story teller' has a long pedigree and an increasing body of scholarly analysis; e.g. (Ganz, 2009[5]). The argument of the EHF project is that education needs to set a new purpose and new goals. Whether they are conscious of it or not, education leaders participate in public narrative, either perpetuating or challenging and replacing taken-for-granted ideas about what education is for. The new paradigm implies the need to call out the old purpose of education, embedded in Human Capital Theory, and replace it with a narrative – crafted for context, culture, history – rounding out the ideas of human flourishing on a thriving planet.

In particular, reframing the human endeavour in the wider framework of our place in nature; constantly stressing our interdependence with the natural world and its fate, are new dimensions to how leaders need now to co-create narrative. Moreover, the new post-COVID (and long overdue) elevation of well-being as a critical element of education's purpose needs to be woven in more explicitly to the story of schools; it is a prerequisite to creating a culture of caring. This includes learners (and the workforce) feeling that they belong, and that they are safe. This is an aim in itself; not merely an instrument for better academic attainment.

Since leaders of education are fundamentally in the business of shaping the future, it is their duty to understand the contours and implications of the disruptive VUCA world. And then to participate in the crafting of a new narrative, envisioning new futures and possibilities – and education's role in getting us there. As Leadbeater points out in the next chapter on system shift, the new purpose/s need to be both intentional and emergent. This means education leaders mobilising new voices in order to articulate the new narrative, in a way that builds first public and then political support. Narrative creation is learnable (multiple programmes exist). The complete suite of knowledge, skills, values and attitudes entailed needs to be worked out in situ.

Orchestrating learning ecosystems

It is imperative that formal education institutions partner with stakeholders outside of the school context to harness the power of non-formal and informal education. The best leaders have always understood the critical role that is played by fostering strong collaborative relationships with the surrounding community, especially parents and carers. Often however the rhetoric has been stronger than the practice. But now, the traditional silos of schooling are no longer adequate to the challenge of providing the range, diversity and personalisation of learning opportunities that young people now need if we are all to thrive. Many more organisations and sectors need to be involved. One way to think about this is to reconceive of 'education systems' (usually top-down hierarchical arrangements of management) as *learning ecosystems*.

The next chapter makes the case for supposing that local learning ecosystems might facilitate education for human flourishing, including the research into emergent practice. As the International Summit on the Teaching Profession (ISTP) put it: The question should not be: 'What can schools do to serve all learners?' *It should be: 'What can schools do to orchestrate various other government entities and community partners, and to leverage broader investments in social infrastructure, in order to give all learners the full range of supports they need?* (ISTP, 2022[6]).

If schools and systems are to move in this direction, it requires a fresh set of competencies for success, that can lead to efficient, effective and sustainable ecosystems. Amongst these are: leading through influence not status; unlocking the learning assets of communities, and extensive engagement with stakeholders beyond the education sector. Considerable work is underway on what this looks like in practice (Luksha, 2020[7]). In the new conditions we face, schools cannot do everything: they need to incorporate themselves in nets of learning opportunities, not least digital ones. With the limitless wealth of such opportunities available to young people online (albeit mostly in the cognitive domain) – likely to be increasingly personalised – leaders need to consider how these can be incorporated into the overall mix. Again: this is a learnable competency. It involves new knowledge and skills, but perhaps more importantly different attitudes and values.

Championing equity

Ethical reasoning is education for human flourishing's foundation stone. And at the heart of any system of ethical reasoning must lie the notion of equity or justice. The problem with incorporating an 'equity' competency in this suite focused on human flourishing is that it is perhaps over-familiar. Nominally at any rate, equity has featured in education's goals (and therefore leadership frames) for three decades. However, in the context of a wide vision of human flourishing, previous conceptions now appear to be inadequate. Whilst we yearn for a peaceful planet, the dehumanising of groups in a culture of dominance is what has led, and continues to lead, to the perpetuation of conflict and the precariousness of peace.

A proper understanding of the idea of human flourishing means that the objective is not to help everyone achieve the same thing, expressed as a single set of minimum education requirements. It is more about helping everyone find their purpose through learning, combining aspirations and distinctively human competencies in order to contribute to shaping a thriving future.

It is essential to grasp how fundamental equity is in terms of achieving a flourishing future on a peaceful planet. Moreover, research and scholarship is indicating that reducing inequality is also key to delivering future prosperity. Boushey (2019[8]) demonstrates how rising inequality is a drain on talent, ideas, and innovation.

That is why it is necessary now to think in terms of equity, diversity and inclusion (EDI) – three distinctive dimensions of this vision. This is not just about equity in outcomes, access or inputs. This is fundamentally about what is valued and how: whose history? Which values? Which cultural norms? It is about celebrating diversity and practising inclusivity – embracing the differences not just of race, gender, LGBTQ; but also of neurodiversity. The competency in this space therefore is understanding and implementing EDI, notwithstanding the uninformed opportunistic attacks upon the notion that emerged in 2025. The increased focus and interest in this area in the last few years is to be welcomed, not least that which addresses the issue of indigeneity – now completely reconsidered in terms of educational goals. Again, the values and attitudes may be foundational; but a core of emergent knowledge and skills is growing – for example, how to conduct an environmental analysis, as a means of understanding local inequalities and perspectives.

Systems thinking: Managing dynamic complexity

Clearly, the complex disrupted environment in which we are now working requires leadership that is capable of thinking in systemic terms, as opposed to linear mechanical ways. It is too much – and unnecessary to expect – leaders to become sophisticated system analysts deploying some of the mapping tools now available in the public sphere.[3] However it is important – especially in the context of moving towards ecosystemic working – that an understanding of how complex issues relate to each other is fostered; and leaders become acquainted with some of the concepts that should be in mind when trying to make sense of confusing, challenging situations. The key concepts here are purpose, power, relationships, resources; and of course their interrelationship.[4] This is a classic case where the knowledge dimension of

this competency (analytical) is supplemented by the human dimensions – attitudes and values of personal understanding and empathy. Our institutions now more than ever need to be agile and flexible (COVID provided the perfect instance of this) - at a time of uncertainty, ambiguity, and risk.

System thinking can help leaders avoid becoming overwhelmed by complexity, and work towards actionable strategies that take into account the range of factors in play. Whilst leaders in public service are increasingly acquiring this competency through their professional learning, school leaders are not. There are now PD prototypes in development.[5]

Leading and managing innovation

The PD frameworks mapped in the appendix make clear the importance of being able to use evidence and research, always with a focus on students' learning. Moreover, a number of PD frameworks stress the need to foster a culture of learning. However, as schools pivot towards the future and a refreshed purpose, this is insufficient. What is needed now is innovation; but innovation which is disciplined, purposeful and carefully evaluated (with the right metrics). Leading and managing this process is all about the competency to "inspire productive action in yourself and others during times of creation, invention, uncertainty, ambiguity, and risk" (Cone, 2019[9]). This entails understanding methods of innovation and how they sit alongside the use of research; involving users –especially learners – in the effort. A range of well-evidenced and developed methodologies now exists and is readily available to be deployed in the endeavour. These methodologies may not be standard in leadership development programs; but their use is growing, new approaches are emerging and expertise becoming more widespread. They include methods like Human Centred Design (Harvard) and Spirals of Inquiry (British Columbia).[6]

Such methodologies offer the leader who aspires to engage in a transformational shift approaches which are similar, in that they:

- place purpose and focus upfront, with the requirement really to debate what the goals are;
- acknowledge the complexity of educational goals and problems, not falling back on managerial linear planning techniques;
- rely upon convened teams of empowered educators to explore, inquire, learn and implement together in a structured, disciplined way;
- utilise prototyping as a technique
- emphasise the importance of involving and engaging the most important actors – the learners, their families and their communities.

This last point is important. EHF depends upon our creating environments where learners are excited about learning, motivated, included and cared for. So the quality of the learner experience must be attended to with a sensitivity which has been markedly lacking in schools' histories (Hannon and Temperley, 2022[10]). Leaders who become competent in these approaches are able to engage in future-focused innovation with real professional responsibility. Again, this is a learnable competency, with well-established methods now available.

Developing agency in others and in self

In the wide consultation processes which accompanied the evolution of OECD's Education and Skills 2030 project, time and again the issue of agency arose – in two ways. First, it became readily apparent that the concept of agency is absolutely fundamental if we are serious about creating self-regulating, purposeful learners with the competencies needed to shape the future. If learners' experience of schooling is one of passive compliance, how can they possibly be expected to cope with – let alone shape – a flourishing future? Hence, *acting in the world* was identified as a key learner competency within the Education for

human flourishing framework, with agency conceived as individual, collaborative and collective. And though the primary suggestion is that people make a greater difference in the world when they work with others, there is also an implication that educators should equip not only individuals with the competencies they need but groups, communities and societies too: in other words, that educators should build collective competency.

However, secondly, educators draw attention to the fact that if they themselves do not experience or enact agency, how can they teach their students to do so? How can it be modelled if the circumstances do not permit it? Therefore, in addition to building their own sense of agency (purpose, identity and action) education leaders need to find ways to enable the learning community – workforce and students – to do so too. But the personal, interior sense of agency by a leader must not be neglected. The internal dimension relates to the transformation of self, the authorising of self.

Past notions in this space were concerned with distributed leadership. An extension of this is the exploration of intergenerational leadership. One important outcome of the UN Summit on Education Transformation in 2022, was a stream of work examining the possibilities of this, and resulting in the guide *Uniting generations and sharing power to transform education*.[7] At both state and institutional level, leaders are developing methods fully to involve learners in the development of strategy and direction.[8]

One way to approach the question of how this competency might be developed is to consider the personal/professional mindsets involved (value and attitudes) and the skills and knowledge that are needed (Qatar Foundation, 2022[11]). Some are highly consistent with previous best practice in existing frameworks (collaboration, systems thinking, strategic working, identifying and releasing talent). Others reflect the reorientation proposed in the new paradigm for young learners: curiosity; networking; prioritisation of own mental health and that of others; empathy and social awareness; value driven.

What does this mean for a learning workforce?

The competencies proposed above are intended to develop systems and institutions directed towards the goal of human flourishing; but of course ultimately this can only be achieved through the direct relationship between teachers and learners, in the classroom and beyond. There needs to be a direct relationship between those competencies and related set for teachers - how we see the role of teachers evolving.

What is it that we need our learning workforce to do? What is the job? What are the outcomes that are sought for young people? Certainly ensuring the mastery of the conventional literacies; certainly competency in key domains of subject knowledge. But scholarship[9], practice, and to some degree, jurisdictional policies have tilted towards a more holistic view, incorporating:

- The ‘4 Cs’ critical thinking, collaboration, creativity, communication
- Character
- Social and emotional competence, including meta-cognition and well-being

In embracing these constructs and seeking to incorporate them in the competencies outlined for human flourishing, this paper by no means neglects the continuing centrality of knowledge. But as the last chapter makes clear, in designing learning learning, teachers need to keep in mind the nature of the knowledge that is to be communicated.

These considerations point to the need for yet further, more ambitious aims for developing the teacher workforce. Lest it be thought such proposals are fanciful or unachievable, it should be noted that every one of the competencies proposed for inclusion in what follows is being modelled in practice right now somewhere in the world. This paper does not deal explicitly with the interstitial role of teacher leadership – seen not as a stepping stone to principalship (though it might be) but as valid in itself. Teacher leadership

is the process in which educators exert influence through relationships and interactions beyond their scope in the classroom. At its best and most powerful it is uniquely rooted in student voice. This is a growing feature in schools, and deserves more attention than space here permits. Focus on it would likely entail a blend of the leadership and teacher competencies here, rather than a distinctive new domain.

Facilitating deep learning

The thrust of the work of the EHF project is that teaching and learning needs to change in a fundamental way to support thriving at all levels: in people, places and on the planet. Such an agenda requires learning that is adequate to the profound challenges and opportunities we face. What we need from a modern education workforce therefore is the capacity to organise experiences, relationships and content in order to foster our expanded ambitions for young people. It embraces pedagogy in particular, but with obvious implications for curriculum (see below). The previous chapter discusses in depth the nature of the pedagogy that needs to be in play. In line with other strong international developments we refer to that here as 'deeper learning' (Paniagua and Istance, 2018[12]), or '4-Dimensional Education'.[10] There are other models driving in the same direction.[11] Considerable effort has gone on, worldwide, to develop adequate pedagogical approaches; all incorporate the features of *teacher-guided learning* and *experiential learning* discussed at length in the previous chapters. It is not the intention of this work to attempt a synthesis or taxonomy of them; and certainly not to prescribe a particular approach.

Teachers rarely engage (as once they did) with theories of constructivism, behaviourism, or liberationism. Systems differ in the degree to which they have discouraged broadcast-style instruction, seeking more interactive methods. What seems important now in considering the professional development that teachers need is to establish that the key competency is that of skilled selection of the appropriate pedagogical approach, focused on facilitating deep learning. The repertoire that is available is extensive, and does not need reinventing by individual teachers or groups – though it can undoubtedly be adapted according to context. The repertoire includes, inter alia:

- Direct instruction
- Problem-based learning
- Cross-disciplinary teaching
- Service learning
- Passion based learning
- Socratic dialogue
- Project-based learning

Whichever approach is in play, it is fundamentally about authentic, challenging learning tasks, preferably ones that are relevant to and engaging for the learner: and these tasks need to go beyond individual, intellectually focused effort. As the range of approaches becomes better codified, and evidence mounts about the circumstances in which they are effective, we will be in a better position to support teachers to become competent in the business of pedagogy selection. This requires:

- Knowledge (of pedagogical repertoire for deeper learning)
- Skills (resource building)
- Values and attitudes (open-mindedness, imagination, professional inclusivity)

Curriculum co-design

The nature of the curriculum itself naturally lies at the heart of this discussion. If the role of teachers continues to be conceived as that of 'delivering' the curriculum, as though it were a parcel, little progress

will be made in pursuing education for human flourishing. Nor however can it be envisaged that the curriculum is an empty space to be filled at teachers' behest. EHF takes the view developed in the course of OECD's *Education and Skills 2030*[12] project that curriculum is a powerful lever which, amongst other things, can ensure a degree of consistency across institutions that contributes to greater equity; but, at the same time, it must be recognised that too much prescription can limit the creativity and agency of students and teachers if there is not sufficient space for them to explore their own interests and sense of purpose. The 2030 project explored extensively the phenomenon of curriculum overload, arguing that in many instances the scales had tipped too far towards prescription. In a world where knowledge is expanding exponentially, this is an untenable approach (Saarivirta and Kumpulainen, 2016[13]).

Each jurisdiction will reach its own settlement on this question. The perspective adopted here is to propose that wherever the balance is struck between state-prescribed curriculum and teacher (or school) autonomy, the essential new competency for teachers is that of *curriculum co-design*.

In the case of state-mandated curriculum, this competency relates to working with state-level experts to co-design the nature of the prescribed content. There are many instances of this in practice – for example the 2030 project took as one case study British Columbia, where the 2017 curriculum redesign process was predicated on a co-design process with serving classroom teachers[13]. This was felt to be key, not only in the quality, rigour and practicality of the work that emerged but also in the process of engaging the workforce as a whole to enact the vision and make it real.

In the space where teachers have autonomy over the curriculum then the competency relates to the co-design process with other stakeholders (learners, other staff, community). In particular, co-designing aspects of the curriculum with learners is an emerging competence: one which many teachers aspire to, but which they recognise can be complex. They need support to acquire the competence.

The purpose of this emphasis on co-design is (a) to ensure that teacher expertise and insight is fully incorporated in the process of state level curriculum redesign; and (b) to emphasise that within a school, agency and co-agency are particularly enhanced when the curriculum is the subject of intentional collaborative work. However, teachers will not be equipped to engage in these co-design processes if they do not acquire the competency. AI has a role to play here also. An advanced example of how this can play out is discussed above on The Knowledge Building Design Studio Community helping students collaborate, learn disciplinary knowledge and acquire 21st Century Competencies and habits of mind. But in addition, the project also improves teacher capacities to facilitate idea-centric practices. Knowledge Building Learning Analytics based on real-time data of students' discussions are used to support reflections by students and teachers, each according to their respective learning objectives.

The knowledge dimension of this competency might start with the principles of curriculum design, which OECD suggests are[14]:

Figure 5.1. Education 2030 Principles of Education Design

Source: OECD, (n.d.[14]), Education 2030 Brochure, https://www.oecd.org/education/2030-project/contact/brochure-thematic-reports-on-curriculum-redesign.pdf.

Schools that have empowered their teachers to engage in curriculum co-design observe that there is sometimes some unlearning to do in terms of values and attitudes: for example, the possibility of non-linear progression (recognising that each student has her/his own learning path and is equipped with different prior knowledge, skills and attitudes when s/he starts school); together with the recognition that a curriculum is a living and evolving tool, not a fixed 'thing'.

Assessment choreography

Across the world there is increasing recognition that conventional methods of assessing learning are not working. One problem is the plethora of functions that assessment is expected to fulfil: from promoting more effective learning in individuals, through judging their performance; through to judging institutions' performance; right through to judging the performance of systems. The result is that the purpose which is at the very heart of all this – promoting powerful learning – is not achieved; least of all in the service of human flourishing. In his critique of the current state of assessment Lucas (2021[15]) points out that not only does high-stakes testing, reliant on standardised tests, have a damaging impact on health and well-being of students, but it is not evidencing the kinds of dispositions and capabilities that society wants (as reported by employers, colleges and universities). Lucas quotes the illuminating analogy suggested by WT Randolph, the Commissioner of Education of Colorado:[15]

> *To solely use standardised achievement tests is like casting a net into the sea – a net that is intentionally designed to let the most interesting fish get away. Then, to describe the ones that are caught strictly in terms of their weight and length is to radically reduce what we know about them. To further conclude that all the contents of the sea consist of fish like those in the net compounds the error further. We need more kinds of fish. We need to know more about those we catch. We need new nets.*

The 'new nets' have been in development and use in a multitude of settings internationally. They include, amongst others[16]:

- Learner profiles (such as those in use in the Mastery Transcript Consortium, the International Baccalaureate [IB], XP School [UK]; Big Picture Learning)

- Psychometric tests (such as Carol Dweck's Growth Mindset Assessment, Harvard's Human Flourishing App)
- Extended Investigations (such as the EPQ in the UK, and the Extended Essay of the IB)
- Micro-credentialing (such as those developed by Digital Promise)

It must be apparent that there is much more to do, both in research and development terms and above all in policy terms to move in this direction to support the goal of human flourishing; and this work is prerequisite to expecting a new competency on the part of teachers who for the most part are not granted the learning and development opportunities to utilise the full range of methods becoming available. Nevertheless: how might we describe the teacher competency that we would be looking for?

Professor Sandra Miligan, Director of the Assessment Research Centre at the University of Melbourne New Metrics for Success project[17] suggests that a teacher who is competent in assessment will have:

- Developed a repertoire that enables them to design, with colleagues and learners, a process of gathering evidence from a variety of contexts so that a learner can show what they are truly capable of in any domain of learning,
- Knowledge of how to make considered judgements (on the basis of the above) about the learner's position on a scale of competence in that domain, from less expert to more expert, interpreting what the learner knows and can do and what they need to learn next, with a sufficient degree of confidence, to support learners in their learning and to provide the recognition of attainment that people can trust.

As High Resolves (2020[16]) has argued, we need to focus on better understanding the best combinations of multimodal assessments to select, depending on context and desired outcomes. In any case, a variety of modalities will be increasingly imperative as AI tools make the inadequacy of conventional methods even more apparent. The acquisition of assessment repertoire is critical. In the pursuit of human flourishing, perhaps the modality of learner profiles is most salient, since these enable students to better manage their own learning, monitor their own progress and recognise the learning skills they already have or need to attain.

So perhaps the metaphor to capture this competency is assessment choreography. It is important that the ask of teachers is both fully supported by the policy as well as the research environment, so that we are not expecting the impossible from teachers. Thus, skills in things like statistics, normal curves, measurement theory, data analytics, item analysis, data banks, data analytics, or standardisation do not feature in the knowledge dimension of this competence. But ideally, teachers should also be able to identify the various ways that incompetent or faulty assessment can crush the will and confidence to learn, narrow the conception of learning, and hence reduce standards of attainment. The 'attitudes' dimension of this competence is important: shifting from the view of assessment which is solely about judgement, towards a wider understanding that encompasses assessment for- and as- learning (Earl, 2012[17]).

Digital literacy

The extensive discussion of AI in the course of this paper has made the case for placing the development of that technology centrally in our thinking about how education for human flourishing must evolve. It has been anticipated for a decade, but perhaps generative Artificial Intelligence (AI) made its breakthrough impact in education with the launch of Chat GPT in 2022. Without doubt, this is but the harbinger of many other products with an accelerating range of applications and user friendliness. Whilst many young people immediately played with the potential of the tool, the response of education systems has been predictably slow and hesitant. That is understandable, since the implications are immense and the stakes are high. The work of the EHF project is predicated on the understanding that AI carries enormous consequences

for the future of humanity; and therefore it is imperative that education crafts a response which is measured and wise.

The Beijing Declaration of 2019[18] recorded an international consensus that AI needed to be integrated into education. 2023 saw the first international guidance on the question (UNESCO, 2023[18]). November 2023 also saw the first international summit on Safety and AI[19] convened by the UK government. The issue has forced itself onto the agenda in education as never before, and responses are still emergent and unclear. What is certain is that AI holds the capacity either to advance the aim of human flourishing as never before or entirely to destroy it. It has been argued that Digitally Enabled Learning Ecosystems (DELEs) – where every child, irrespective of geography and socio economic status, has access to adaptive learning and AI that safely and securely adds value to the learning experience – have the potential utterly to transform education in pursuit of human thriving (Barrett and Harte, 2023[19]).

What then might we reasonably expect of teachers in this fast-moving but highly consequential domain? What is clearly unacceptable is for the education workforce to lag behind the world their learners are entering. Plainly, education content is almost literally infinite and widely available. New tools are coming online daily. Since the perspective of the EHF project has been to advocate for the development of learning ecosystems, the part to be played by AI and technology in general must also be key. There are many dimensions to the creation of such ecosystems – including strategy, connectivity, platforms, etc. Here we focus on what is entailed for teacher's competency and therefore their professional development. According to 2023 survey data on the governmental use of AI for education, only some seven countries (China, Finland, Georgia, Qatar, Spain, Thailand and Türkiye) reported that they had developed or were developing frameworks or training programmes on AI for teachers. Only the Ministry of Education of Singapore reported building an online repository centred on the use of ChatGPT in teaching and learning (UNESCO, 2023[18]). And in this paper, the Singaporean contribution notes the practical developments they have supported: they show how, to prepare for experiential learning, teachers may ask AI to suggest spaces where concrete experiences can occur, plan activities for reflective observations, collate student collected data to formulate theories, and show students how these theories can be used to solve new sets of problems and make decisions that are correct, even ethical.

According to TALIS (the Teachers and Learning International Survey), teachers identify developing technology skills for teaching as their second-most important professional learning need, but 44 percent of teachers in OECD countries do not receive any technology-related professional learning. And systems spend substantial money on new technologies without investing in helping teachers to use it more effectively (Schleicher, 2022[20]).

It is clear from UNESCO's reviews that as yet, little work has been done to reassess the competencies needed by teachers to understand and use AI for teaching, learning and for their own professional learning; nor yet the advocacy work to ensure that these are integrated into professional development frameworks. In lieu of this detailed work, we advance here simply the notions that the required competency entails:

Knowledge and skills to navigate widely available generative AI tools; to use appropriate such tools for their own professional development; to deploy AI tools in their assessment 'repertoire' as decribed above in the previous chapter; to employ and critique tools for the use of students themselves (since students will in any case be experimenting with them); understand ethical considerations; to personalise by utilising earning analytics software to determine how students are learning, what content and ideas excite them, and when and where they are disengaging.

Value and attitudes that, whilst deploying AI tools wisely to optimise opportunities, yet remain vigilant about their shortcomings and risks (tech professionals refer to the tendency of AI to 'hallucinate'[20]); open and curious attitudes to AI that facilitate appreciative utilisation.

Conclusion and recommendation

In summary, this report proposes that, in pursuit of education for human flourishing, the professional development of both leaders and the education workforce needs to be reconsidered. The suggestion is that frameworks for this development need to include a set of new competencies. These are:

Leadership competencies:

- Re-booting educational purpose through narrative
- Orchestrating learning ecosystems
- Championing equity
- Systems thinking: managing dynamic complexity
- Leading and managing innovation
- Developing Agency in others and in self

Teacher competencies:

- Facilitating deep learning
- Curriculum co-design
- Assessment choreography
- Digital literacy

These suggestions are made in the full awareness of the crisis facing education in terms of recruitment. UNESCO's estimates indicate the need globally for an additional 24.4 million teachers in primary education and some 44.4 million teachers for secondary education, in order to achieve universal basic education by 2030.[21] Latest convenings of the ISTP have made commitments to reorganising teachers' time and working conditions to support teachers in their shifting role; and to rethinking preservice and in-service professional learning (ISTP, 2022[6]). Central to this a is a vison of a much more collaborative profession. As the ISTP gatherings have made clear, we face a choice: taking the education workforce in the High Competency-High Wage direction (the hallmark of a number of high performing systems); or accepting a lower level of professionalism, less job satisfaction and the current spiral of decline.

The suggestions are consistent with other work on the future of teaching and 'the new professionalism'[22], but place particular focus on the implications of a serious focus on education for human flourishing as our paramount goal.

No part of the framework proposed above is merely theoretical or hypothetical. Every dimension has real-life correlates in the real world, in action now. Perhaps jurisdictions might ask the questions: how might these competency sets fit our context with and resonate in our circumstances? What depth work needs to be done in terms of further research and developments to pursue this direction of travel?

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Notes

[1] As examples, see the suite of publications produced by the WISE All-In group: https://www.wise-qatar.org/education-disrupted-leadership-for-a-new-era.

[2] Leadbeater and Winhall 2022 https://www.systeminnovation.org/green-paper; Big Change: Three Drivers to Transform Education Systems 2023 https://www.big-change.org/publication/new-education-story.

[3] For example the Mapping tool produced by the International Public Policy Observatory https://theippo.co.uk/mapping-systems-for-policy-impact-introducing-ippos-seppa-method.

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[5] For example, Leadbeater's work with the Association of Independent Schools in South Australia (AISSA) on systems thinking in the *Learning Impact Project.*

[6] Harvard Design Thinking in Education https://tll.gse.harvard.edu/designthinking#:~:text=Design%20Thinking%20is%20a%20mindset,refining%20ideas%2C%20and%20testing%20solutions; Spirals of Enquiry. See Halbert and Kaser, 2013; and see also www.noiie.ca.

[7] https://neweducationstory.big-change.org/uniting-generations-and-sharing-power-to-transform-education.

[8] https://neweducationstory.big-change.org/uniting-generations-and-sharing-power-to-transform-education.

[9] See the Center for Curriculum Redesign https://curriculumredesign.org/ccr-releases-4d-framework-1-0-for-skills-character-and-meta-learning.

[10] https://curriculumredesign.org/our-work/four-dimensional-21st-century-education-learning-competencies-future-2030/.

[11] See, as examples, Big Picture Learning https://www.bigpicture.org/approach; Education Reimagined: https://education-reimagined.org/wp-content/uploads/2021/01/A-Transformational-Vision-for-Education-in-the-US.pdf.

[12] See in particular the project's paper on curriculum redesign.

[13] https://curriculum.gov.bc.ca/rethinking-curriculum.

[14] https://www.oecd.org/education/2030-project/contact/brochure-thematic-reports-on-curriculum-redesign.pdf.

[15] pz.harvard.edu/sites/default/files/AssessmentReimagined_Booklet_0.pdf.

[16] For a full discussion of new methods see Lucas (2021) and Miligan (2020)

[17] Email communication with the author October 2023.

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[19] https://www.gov.uk/government/topical-events/ai-safety-summit-2023.

[20] https://www.techtarget.com/whatis/definition/AI-hallucination

[21] See https://www.unesco.org/en/articles/world-teachers-day-unesco-sounds-alarm-global-teacher-shortage-crisis.

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6 Education for human flourishing and systems

As the Education for human flourishing framework has emerged, with increasing clarity on competencies, learning environments and professional development, the High Performing Systems Initiative has placed greater emphasis on what it means for systems. What does Education for human flourishing imply for conceptualising and leading education provision, at system level?

The foundational arguments offer systems a set of principles. They should develop a broader range of capabilities, including those for caring and creativity. They should enable young people to build economic, societal and organisational models for future flourishing. And they should restore a sense of meaning in their lives, by encouraging individual and collective agency.

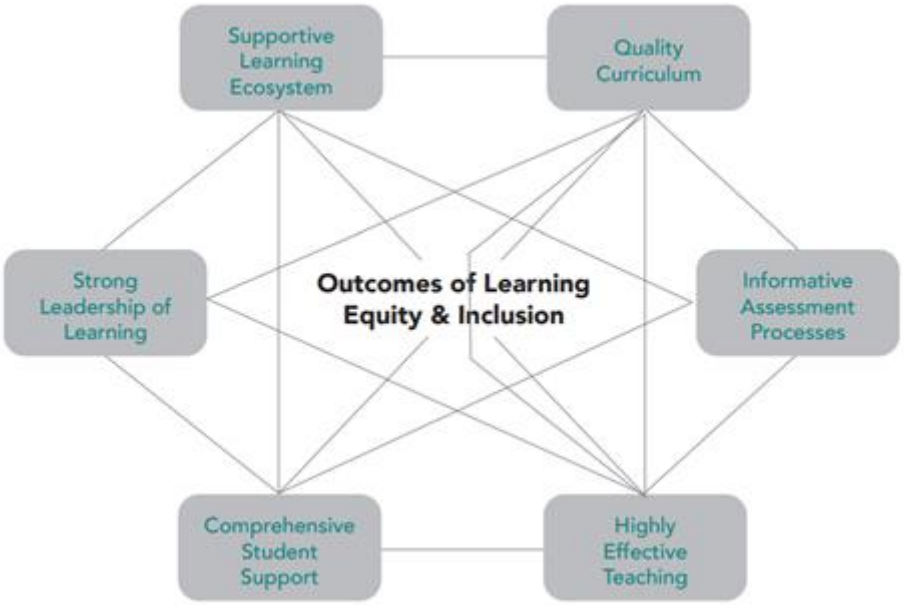
The approach we have taken to our thinking on systems is to identify trajectories that can help realise these principles. We begin with the best education systems we have today, as a foundation for future systems. We next consider two issues, already central to policy discussion, that an Education for human flourishing perspective makes more central still: equity in education and the expansion of learning beyond formal schooling. We then consider strategies for leading change in systems where, as with Education for human flourishing, a new purpose has already been chosen. And we end with a reflection on education leadership. To what extent does system transformation depend on personal transformation in leaders?

Our thinking represents a sketch not a blueprint. More than other dimensions of Education for human flourishing, the systems dimension is sensitive to existing architecture, cultural context and political constraints. It deserves further work over a longer period.

Today's education systems

A significant output from the first phase of High Performing Systems (2019-2022) was a review of schooling arrangements in British Colombia, Estonia, Finland, Hong Kong and South Korea. The review produced a framework "for thinking about and studying any jurisdiction's learning system".

Figure 6.1. Conceptualising a learning system



Note: Each component is designed to work with the other components to deliver the jurisdiction's desired outcomes of learning and create learning conditions that are equitable and inclusive of all. This shared purpose, and their considerable interdependence, make the six components "a system" (Masters, 2023[1]).
Source: Masters (2023[1]), Building a World-Class System, NCEE.

The central aspirations and six components of Masters' framework are fully consistent with Education for human flourishing. But the framework does not entail Education for human flourishing. For that, some of the major features need to be developed.

Highly-effective teaching and strong leadership of learning have already been considered in previous chapters, by Christine Goh and Michael Tan and Valerie Hannon.

The learning outcomes come ready-specified. They are the development of competencies which are themselves the principal route to realising the system principles: it is precisely by nurturing ethical, adaptive problem-solving and meaning-making competencies that human capabilities can be broadened, new models can be built and purpose restored to lives. The Education for human flourishing competencies have been analysed earlier in this section and will not be discussed further here.

Masters defines equitable and inclusive learning conditions as "the promotion of learning environments that are culturally responsive, student-centred/personalised, intrinsically motivating, collaborative, technology-enabled, untracked and continuous/seamless." Equity is the foundation stone of Education for human flourishing. There is an opportunity to sharpen its definition, drawing on new thinking about the interplay of equality and diversity; and to suggest a bolder way of measuring it, related to new competencies and new education purposes.

Masters refers to the supportive learning ecosystem. Education for human flourishing suggests that the ecosystem should be more than a component of the system. Over time it might subsume the system.

Lastly, it is worth thinking about what processes of design and implementation might be appropriate to Education for human flourishing and capable of making it happen.

Equity, ecosystems and strategies for design and implementation frame the rest of our reflection on systems for Education for human flourishing.

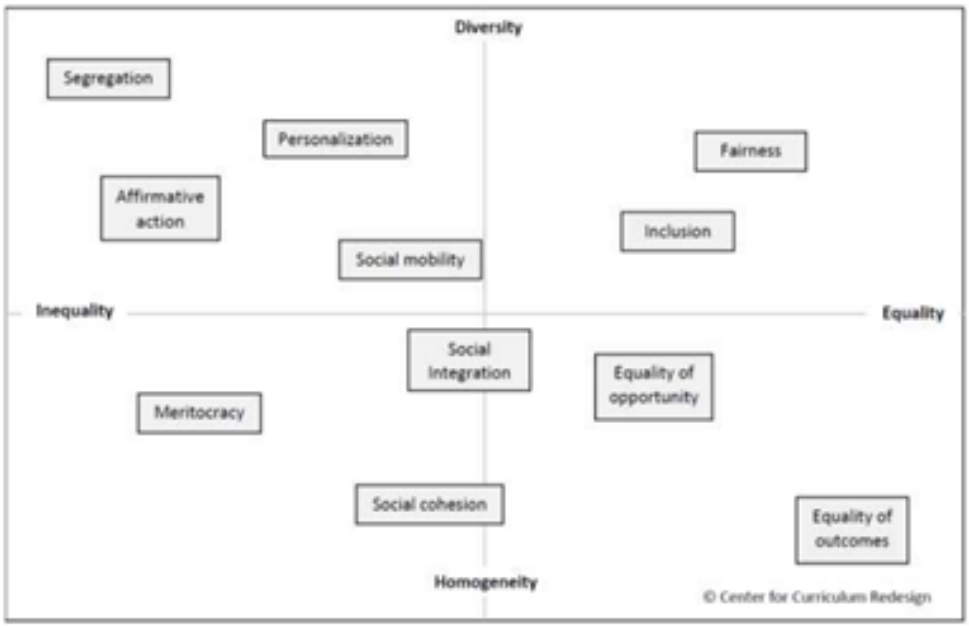
Equity

Dirk van Damme points out that the concept of equity has become more complex (2022[2]). Equity policies were developed to ensure that the variance in student performance attributed to socio-economic disadvantage should be as close as possible to zero. Today they address a broader understanding of disadvantage, encompassing gender, race, sexual orientation, migration status, geography, religion, age and disability. He argues that a modern account of equity and social justice should balance diversity with equality. And by plotting relevant concepts against both diversity and equality, he concludes that the most promising policy goals are social inclusion and fairness.

Van Damme takes a bold approach to fairness. He suggests that removing barriers is not enough: disadvantaged students should be compensated to create a level playing field. His perspective on social inclusion is nuanced, juxtaposing individual intervention with the collective good.

> *The concept of social inclusion aims to counter social exclusion by explicitly focusing social justice on the basic needs of all individuals to be positively recognised in their human dignity, to be connected and able to fully participate in social life…an inclusive approach in education positively values diversity but aims not to develop diverse talents and abilities by special treatment, excessive personalisation or segregation but by bringing students together and connecting them to the collective good.*

Figure 6.2. Two-dimensional mapping of different concepts of social justice in education



Source: Leadbeater and Winhall (2024[3]), Building Better Systems, Systems Innovation.

This reconciliation of equality and diversity through social inclusion and fairness provides a robust underpinning for the Education for human flourishing framework.

At the level of system principles, fairness suggests that students should be compensated to develop a full range of capabilities, while social inclusion requires that those capabilities should be harnessed to securing the collective good, expressed in new societal, economic and organisational models for the future.

At the level of competencies, the values of fairness and social inclusion are combined in Ethical Competence and especially Understanding the World, where students learn to identify, respect and

synthesise different worldviews to advance better collective outcomes. For Acting in the World, the keystone competence, individual children might be supported to develop purpose and intent in the service of the common good.

Finally, van Damme's approach guides the framing of human flourishing itself. Individual flourishing, on the one hand, suggests support for students to realise long-term happiness, friendships, meaning and accomplishment. On the other hand, collective flourishing, for families, communities and the planet, underlines the centrality of a shared collective good.

Ecosystems

Education for human flourishing implies an expansion of the learning programme, to provide a broader range of student opportunities. The three meaning-making competencies, in particular, depend on experiences beyond the boundaries of school education, in the form of immersion in other cultures and perspectives, exposure to the arts and the natural world and engagement in purpose-forming activities such as entrepreneurship and volunteering.

A promising way to think about this is to see Education for human flourishing as an arena for combining school and college provision with that of other organisations, in a way that balances formal and non-formal education. The concept draws on the ecosystemic approach to education and develops it.

In education, the origins of ecosystem thinking lie in the school partnerships movement: co-opting arts organisations and businesses to support specific dimensions of the curriculum. But in recent years, a broader concept has developed. This is the free-standing learning ecosystem.

In Europe and North America, learning ecosystems usually incorporate the formal system in order to turbo-charge its schools and colleges. Remake Learning, in Pittsburgh, mobilises parental support (family learning) and ensures a deep engagement with museums, galleries and businesses. DigiOne, in six Finnish cities, underpins a similar strategy with networked data and content. In Catalonia, the learning ecosystem supplements formal education with out-of-term learning in rural areas. In Latin America, South Asia and Africa, learning ecosystems may or may not be linked to the formal system. Fundacion mi Sangre, in post-civil war Colombia, provides independent non-formal learning. Using arts-based pedagogies, it places students, employers and former guerrillas in learning circles, to explore and address community problems. In Delhi, which has developed the Happiness Curriculum to counter poverty and misogyny, external organisations are creating an alternative school-based learning experience, using meditation and family-based problem-solving (Clayton et al., 2023[4]).

There are common features across all these learning ecosystems: multiple providers, innovative curricula and pedagogies and shared funding and governance. Increasingly, all five describe their purposes in the language of human flourishing, as a response to adversity.

Masters presents the supportive learning ecosystem as one dimension of the formal system (see figure above). Emerging in different parts of the world, the broader learning ecosystem is establishing a bolder relationship to the formal system, sometimes accelerating or reimagining it from within, sometimes complementing and challenging it from outside. From a human flourishing perspective, it is this broader learning ecosystem that is so suggestive for the future. Is tomorrow's policymaker someone who nurtures and balances formal and non-formal learning, equitably, to expand the perspectives, experiences and purposes of each student?

Shifting the system

We have adapted Masters' account of a learning system to conceptualise a learning system in the service of Education for human flourishing, first by sharpening its emphasis on equity and inclusion, second by giving greater space to concepts of ecosystem. If that is the desired end-state, what approach might be taken to getting there? In an unpublished note for a webinar held in 2024 with the HPST Heads of Strategy, Charles Leadbeater introduced the theory of System Shift (Leadbeater and Winhall, 2024[3]). Following Donella Meadows, he argues that shifting a system requires a co-ordinated approach to changing purpose, power, relationships and resource flows. But the greatest of these is purpose.

One of the most effective ways to reconfigure an entire system is to reframe its purpose: to shift from responding to knife crime to preventing it at source; to shift from health care as curative medical interventions once someone becomes ill to helping people live longer, healthier lives with a sense of well-being. Standard policy interventions in systems tend to have shallow leverage because they work within the parameters of the current system.

Can you choose a new sense of purpose, intentionally acting upon it, or does a new purpose emerge, from a process of discovery and experimentation? Is it more like choosing a new kitchen by looking through a catalogue or is it more like falling in love, you just find yourself doing it? How do you find the best combination of both intentional, deliberate planned change and emergent, unfolding, unanticipated change?

Systems Innovation requires us to be **intentional**. Here, vision of purpose is vital. It helps steer direction and orchestrate energy around shared missions, demanding of us that we reach for new possibilities and be purposeful in our actions. It calls on us to stand up for what we believe in, to uphold our values.

Yet, systems innovation also requires us to be **emergent**. Here, purpose is unfolding and evolutionary, seeking beyond the horizons of what we know today and acknowledging the uncertainties and adaption required of us in change. Such emergence calls for us to be adaptive and reflective, to hold many perspectives at once. Emergence demands us move at the pace of relationships, sometimes slowly and at other times very fast.

If a new system purpose emerges through a process which is both **intentional** and **emergent**, how far can you reset the purpose of a system in advance of change (like deciding to put a man on the moon) and how far does a new purpose emerge through the process of change (the way that public water systems in the 19th century emerged in tandem with new medical sciences and insights into water borne disease.) Many technologies (the telephone, the record player) only found their purpose after they were invented. It was consumers not inventors who worked out what they might be for. Edison thought the record player would record conversations over the telephone. It was consumers and entrepreneurs who found it was for playing music.

Politicians like to set missions, visions, goals for society and systems. The purpose is decided on before the action begins to achieve it. The reality however is that purpose often emerges through discovery, experimentation and interpretation in the process of change itself. Purpose is a product of change not the starting point for change.

Can systems only reset their purpose periodically, to match larger shifts in the landscape in which they work, every twenty years or so; or do systems need a permanent capacity to seek out emerging purposes in a rapidly changing world? In Banathy's framework systems that are deterministic or purposive have their system reset episodically; systems that are heuristic or purpose seeking are continually learning about what their purpose should be. What is the best combination of these approaches?

A further question is whether a system needs a purpose, singular or purposes, plural. There's a case for both.

An overarching shared purpose is vital to steer direction and orchestrate energy around a shared mission. The many players in a system will only come together with clarity and coherence. The downsides of having a clear, singular purpose is that it might be mistaken, or too narrow.

That suggests it might be better to think of a system having purposes, plural.

That might be more realistic given the many different stakeholders in a system and their differing interests. Teachers will not have quite the same interests and purposes as students and principals. Teacher unions might be at odds with politicians and regulators. Shifting a system with many different stakeholders means creating a consensus between players with different interests, different purposes.

And in the long run it might be better for example for a health system to combine several different approaches to health, from the preventative to the curative. A system which is organised around a single purpose and narrow single metric - shareholder value - can also create unintended consequences. Healthy systems do not tend to be monocultures.

The downside is that systems that have plural purposes can also often suffer a lot of internal competition, painful trade-offs and confusion.

Is the most productive approach likely to involve a combination, finding a way to accommodate a diversity of sub-purposes within a single overarching purpose? If so, that also implies that the process of creating a shared purpose involves a lot of dialogue and high levels of trust between the players in a system. It's not a process that can be driven at pace from on high. The Apollo moonshot programme is only one version of how to create a system around a mission.

The approach a system takes to arriving at a new sense of purpose will depend on an interplay between the political and social context, the institutional framework and the kind of purpose in question. Does the idea of education as human flourishing commit one to a particular approach to how a system creates a new sense of purpose?

If the purpose is to achieve measurable results in quantifiable outcomes, then a deterministic approach to purpose may work, especially in jurisdictions in which political authority commands trust and legitimacy. The political process can decide on the preferred outcomes; the system can be driven to deliver those outcomes.

Yet if a system were to take this approach to human flourishing it would create a very stunted version of flourishing. The adoption of human flourishing as a goal for education systems would then also commit systems to an approach to change appropriate to that goal. To achieve human flourishing a system would need a more open, regenerative, interpretative, approach, to allow purpose to emerge from learning, experimentation and adaptation across the system as it develops a renewed, widespread and deeply felt sense of purpose. It cannot be something specified in detail from on high in advance. It would depend on a generative interplay between intention and emergence.

System transformation

If the justifying conditions for purpose-led system shift are systemic challenge and opportunity, then those conditions are met in today's world. The analysis made by the high-performing jurisdictions and presented in the foundational arguments establishes both challenge and opportunity, and Education for human flourishing represents a powerful response.

From a policymaker perspective, two questions remain. The first is exactly how to strike the balance between intention and emergence in nurturing an education system oriented to human flourishing. The second is the scale of the shift. Education for human flourishing entails new competencies and learning

environments, fresh directions for the profession and a very different system. This looks like transformation. How can it be achieved?

Otto Scharmer points the way to system transformation through a process designed to balance intention and emergence. Awareness-based systems-thinking focuses on social fields, distinguishing between systems and soil.

Figure 6.3. Social fields

Source: C. Otto Scharmer (2018[5]), The Essentials of Theory U.

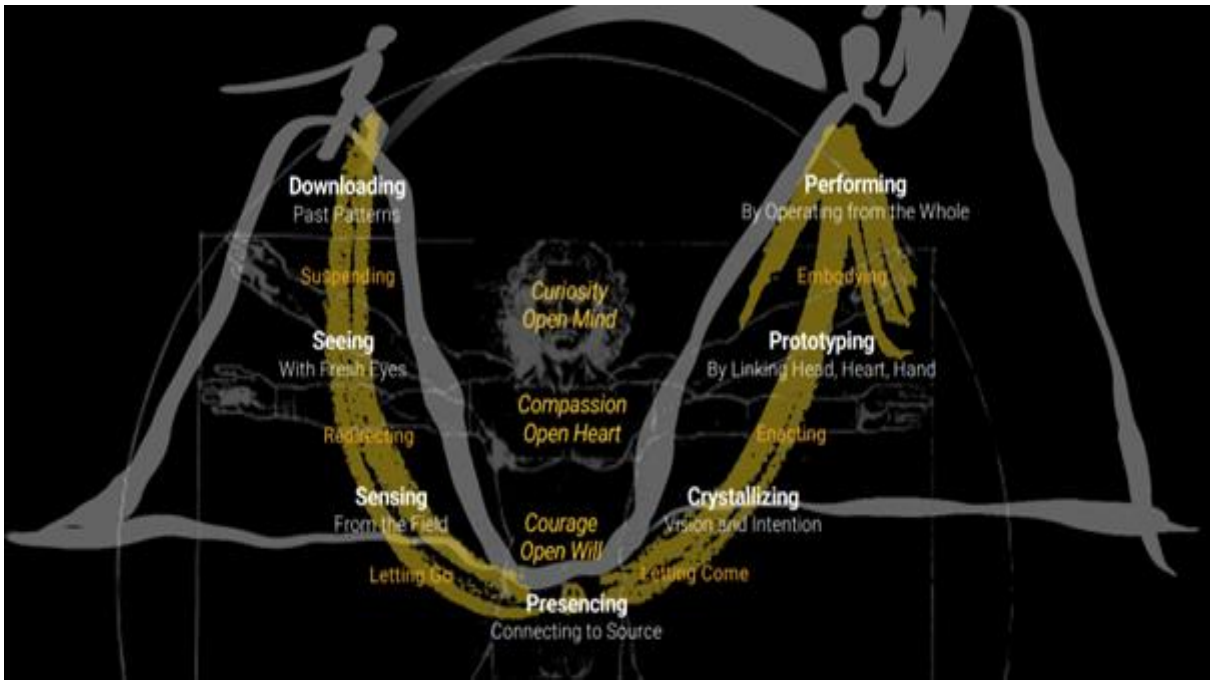
Scharmer argues that the quality of awareness and relationships is critical to achieving system transformation. In all sectors, he suggests, systems are in transition. Some are still oriented to output and efficiency. Many are oriented to users and stakeholders. In the next phase, systems should be ecosystemic and regenerative. But this will require ecosystemic and regenerative awareness and relationships (2018[5]).

Across four kinds of system activity (micro, meso and macro), he sets out what such awareness and relationships looks like. The first kind of activity is listening. It involves not only factual or empathic listening but holding a space for what is ready to emerge. The second kind is conversation, the art of thinking together, of giving birth to new ideas, imaginings, identities and energies. The third kind is organising, through "decision-making circles that develop the capacity to act from local knowledge while being aware of cross-organisational interdependency and aligned by a shared purpose". The fourth kind is co-ordinating and governing. Here, "the natural self-interest of the players extends to a shared awareness of the whole ecosystem. Ecosystem awareness requires us to open the heart and internalise the views and concerns of others. The result is decisions and outcomes that benefit the whole system, not just my part of it".

Working with British Colombia, Estonia, Finland and International Baccalaureate, Scharmer has piloted a leadership development programme. It is designed to equip education leaders to facilitate system transformation in support of Education for human flourishing, by nurturing ecosystemic and regenerative awareness and relationships.

The underpinning process invites groups of leaders, working collaboratively within their jurisdictions, to develop intention by sensing what is ready to emerge and then prototyping specific ideas and initiatives.

Figure 6.4. Theory U



Source: C. Otto Scharmer (2018[5]), *The Essentials of Theory U*.

Conclusion

The discussion of systems has brought three themes into relief. The first is purpose. Originally seen at the centre of Masters' learning system template (2023[1]), it becomes the key to "system shift" in support of Education for human flourishing. The second theme is ecosystems, which both guide the integration of formal and non-formal learning and deepen the quality of awareness and relationships. A third theme is the potential for system transformation when purpose and awareness work in tandem.

The argument about systems echoes the argument about students. There too, individual purpose, developed through intent and agency, is an organising idea, anchoring Acting in the World, the fifth competency that builds on the other four. And if the heart of the ecosystemic approach is a deepening of consciousness, reflecting the self in the whole, then that is exactly what the competencies together imply.

For systems and for people, transformation is often claimed but rarely achieved. In the case of systems, personal transformation may be a first and necessary step.

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In the future, education systems should nurture a broader range of capabilities, help restore meaning to young people's lives and equip them with the skills and ambition to remake our societies, economies and organisations. To flourish over a lifetime, people will need to be adaptive problem solvers, ethically competent and able to understand, appreciate and act in the world. In the age of AI, education must strengthen human agency, human meaning and human security.

Since 2020, the OECD has developing far-reaching ideas on the future purposes of education, based on policy dialogues with seven high performing PISA systems. The Human Capital model, which has shaped what students learn for many decades, prepares young people for yesterday's jobs, through cognitive examinations. Education for Human Flourishing will equip young people for lives of purpose and fulfilment. The framework is helping shape the international conversation about the future of education. It is a vital ingredient in the development of PISA and a contribution to national policymaking, for countries wishing to reorient education purposes, policies and practices. It will be of interest to ministers, officials, students, teachers, school leaders, researchers and education innovators.

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