Curriculum (re)design

A series of thematic reports from the OECD Education 2030 project

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Foreword

Curriculum is a powerful lever for changing student performance and well-being, and for preparing students to thrive in and shape the future. It can help to ensure consistent levels of quality across types of education provision and age groups, contributing to a more equitable system. It can also guide and support teachers, facilitate communication between teachers and parents, and ensure continuity across different levels of education.

However, curriculum can equally 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. Also, if curriculum remains unchanged for years, it may lack the necessary innovation to adapt to changes in society. Therefore, countries periodically reform curriculum to ensure that it is relevant to students and to the world outside of school.

Around 2015, amid growing global debate on globalisation and migration, climate change, and technological advancements such as artificial intelligence, countries began to revisit questions on the kinds of competencies students would need for the future and how these could best be fostered through curriculum. Furthermore, while curriculum had long been considered a highly domestic issue with high-stakes and sensitive political implications, there was a clearly identified need to consolidate an evidence base that would support countries in creating systematic curriculum design processes.

To help countries respond to these questions, the OECD Secretariat set out to update the OECD's Definition and Selection of Key Competencies and to undertake an international comparative curriculum analysis, and the Future of Education and Skills 2030 (Education 2030) project was launched.

The project comprises several elements, all characterised by a forward-thinking approach. Education 2030 is a resource for education systems striving to respond to an ever-changing world. It is based on cutting-edge research, international data and country examples, with input from diverse experts and stakeholders, including government representatives, teachers and school leaders, teacher educators, international organisations, social partners, thought leaders, academic experts and, most importantly, students themselves.[1]

Specifically, the project aims to support countries in their efforts to respond to the following far-reaching questions:

- **What kinds of knowledge, skills, attitudes and values are necessary to understand, engage with and shape a changing world towards a better future in 2030?**
- **How can policies and practices be transformed effectively to support young people's learning and well-being in the context of changing societies and economies?**

The answer to the first question has developed into a comprehensive future-oriented learning framework, the **OECD Learning Compass 2030**. The three transformative competencies set out in the Compass (**creating new value, reconciling tensions and dilemmas, and taking responsibility**) are more relevant than ever during the current COVID-19 pandemic – not only for students, but also for teachers, parents and everyone striving to navigate through the uncertainty, ambiguity and complexity of our daily lives. It's time to determine if we are equipped with these transformative competencies to shape a better future and work towards well-being for ourselves, for others and for our planet.

The COVID-19 pandemic has also revealed and amplified the weaknesses of current systems. It has highlighted the urgent need to think differently about how to close the equity gaps that have existed and are now growing. The COVID-19 context has accelerated this analysis to make it as relevant as possible to

1. Information on working methods, data collection and data analysis can be found at https://www.oecd.org/education/2030-project/

tackle existing challenges, particularly that of **placing student well-being at the centre of curriculum design and redesign**. A series of six reports on curriculum will analyse the following issues:

- **managing time lag between today's curriculum and future needs**
- **addressing curriculum overload**
- **ensuring equity through curriculum innovations**
- **realising curriculum flexibility and autonomy**
- **embedding values in the curriculum**
- **adopting an ecosystem approach to curriculum redesign and implementation.**

Each report will synthesise the best available research literature, drawing on a wide variety of internationally comparative data sources and rich country examples, to describe current approaches to curriculum redesign, highlight common challenges experienced and promising strategies adopted, and draw out key lessons from countries' experiences.

Of course, national contexts vary widely, and curriculum redesign will naturally and necessarily differ across countries. However, the Education 2030 curriculum analysis shows that countries often encounter similar issues in curriculum redesign and that there may be much that they can learn from one another's experiences.

Systematic and evidence-based curriculum design and implementation likely offer the best chance to equip students with the knowledge, skills, attitudes and values that they need to shape their future and thrive. This series of reports moves us closer to that shared goal.

Andreas Schleicher
Director for Education and Skills
Special Advisor on Education Policy to the Secretary-General

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The Future of Education and Skills 2030

The overarching mission of the OECD Future of Education and Skills 2030 is to answer big questions in education:

- **"What" questions** – what kinds of competencies (skills, knowledge, values and attitudes) do today's students need to shape the future for individual, societal and environmental well-being?
- **"How" questions** – how to design learning environments that can foster these competencies, i.e. how to design and implement future-oriented curricula.

The first phase of work involved the development of a conceptual framework setting out a future vision of learning towards 2030. This framework became the **OECD Learning Compass 2030**, launched in 2019.

The OECD Learning Compass 2030

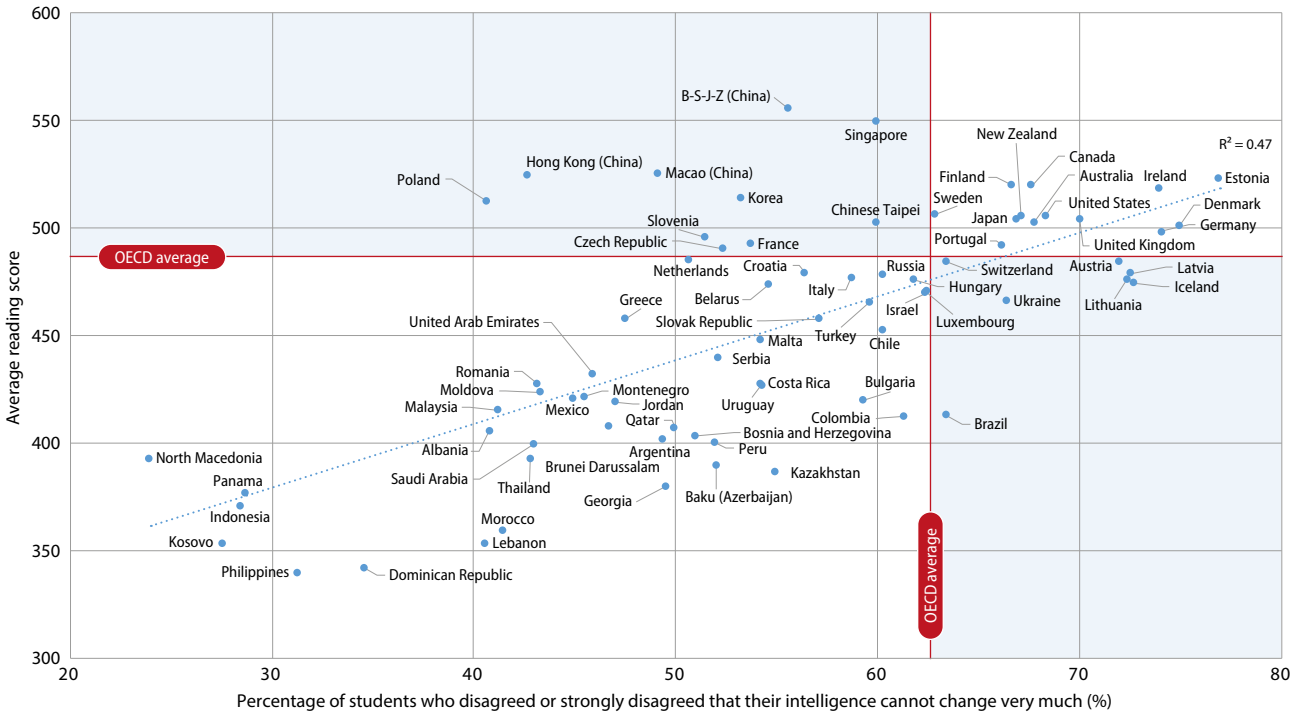
The OECD Learning Compass 2030 sets out an **aspirational vision for the future of education**. The framework is the product of collaboration among government representatives, academic experts, school leaders, teachers, students and social partners from around the world who have a genuine interest in supporting positive change in education systems.

The Learning Compass supports the **wider goals of education** and defines the **competencies that learners need to thrive in and shape a better future** (i.e. to fulfil their potential and contribute to the well-being of their communities and the planet). The metaphor of a learning compass was adopted to emphasise the need for students to learn to navigate by themselves through increasingly volatile, uncertain, complex and ambiguous contexts and to find their direction towards a better future in a meaningful and responsible way, instead of simply receiving fixed instructions or directions from their teachers.

Central to the Learning Compass are the concepts of **student agency** and **co-agency**. Students need to exercise purpose and responsibility in their pursuit of learning and the transition to adulthood. Student agency is defined as **the ability, will and beliefs (e.g. growth mindset) to positively influence their own lives and the world around them.** It entails having the capacity to set a goal, reflect and act responsibly to effect change. It is about acting rather than being acted upon, shaping rather than being shaped, and making responsible decisions and choices, rather than accepting those determined by others. Instilling a growth mindset in students could result in better academic performance (Figure 1). This may be because students with a belief that they can learn and improve are more motivated, have stronger drive and have better 'learning to learn' skills than other students.

Students learn, grow and exercise their agency in social contexts. They learn based on reciprocal relationships with their peers, teachers, families and communities, all

Figure 1. **Growth mindset and student performance**



Source: PISA 2018

of whom interact with and guide students towards well-being. This is the concept of co-agency (Figure 2)

The components of the compass include core foundations, transformative competencies, and a cycle of anticipation, action and reflection (OECD, 2019[1]).

- **Core foundations** are the fundamental conditions and core knowledge, skills, attitudes and values that are prerequisites for further learning across the entire curriculum. They include literacy and numeracy, as well as digital literacy and data literacy, physical and mental health, and social and emotional foundations.

- Learners need to develop a sense of themselves in the world. To adapt to complexity and uncertainty and be able to help shape a better future, every learner needs to be equipped with certain **transformative competencies**. These specific competencies enable students to develop and reflect on their own perspective, and they are necessary for learning how to shape and contribute to a changing world. Creating new value, taking responsibility, and reconciling tensions, dilemmas, trade-offs and contradictions are all examples of such competencies.

- The **Anticipation-Action-Reflection (AAR) cycle** is an iterative learning process whereby learners continuously develop competencies by anticipating future needs or hypothesising, taking action, reflecting on the action, and adapting future actions accordingly. The AAR cycle is a catalyst for students to develop the transformative competencies to continually improve their thinking and act intentionally and responsibly towards collective well-being.

During the COVID-19 pandemic, the transformative competencies set out in the Compass (creating new value, reconciling tensions and dilemmas, and taking responsibility) have become more relevant than ever for students, teachers and parents.

The Education 2030 project had already observed innovative features of education systems emerging in recent years, creating a vision of a new normal in education (Table 1). The pandemic has drastically accelerated the development of innovations and new opportunities, and such initiatives have become commonplace, bringing the co-created vision closer to reality.

Figure 2. **The OECD Learning Compass 2030**

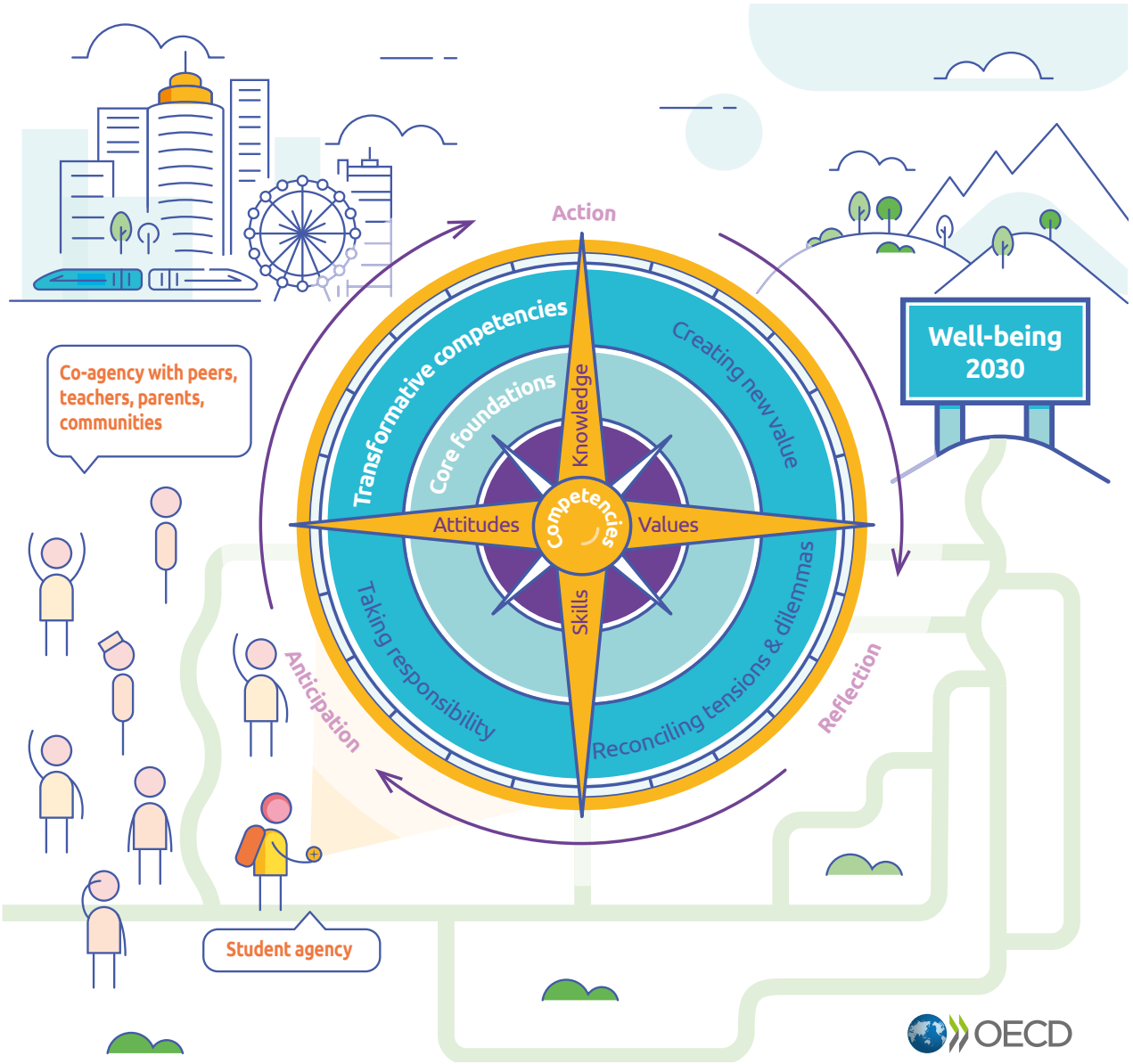


Table 1. **The new normal in education**

Features	Traditional education system	An education system embodying the "new normal"
Education system	Education system is **an independent entity**	Education system is **part of a larger ecosystem**
Responsibility and stakeholders' engagement	**Decisions made based on a selected group of people** and thus they become held accountable and responsible for the decisions made **Division of labour** (principals manage schools, teachers teach, students listen to teachers and learn)	**Decision-making and responsibilities shared among stakeholders**, including parents, employers, communities and students **Shared responsibility** (everyone works together and assumes responsibility for a student's education and students also learn to be responsible for their own learning)
Approach to effectiveness and to quality of school experience	**Outcomes valued most** (student performance, student achievements are valued as indicators to evaluate systems for accountability and for system improvement) Focus on academic performance	**Valuing not only "outcomes" but also "process"** (in addition to student performance and student achievements, students' learning experiences are in and of themselves recognised as having intrinsic value) **Focus on not only academic performance but also on holistic student well-being**
Approach to curriculum design and learning progression	**Linear and standardised progression** (the curriculum is developed based on a standardised, linear learning progression model)	**Non-linear progression** (recognising that each student has his/her own learning path and is equipped with different prior knowledge, skills and attitudes when he/she starts school)
Focus of monitoring	**Valuing accountability and compliance**	**System accountability as well as system improvements** (e.g. continuous improvement through frequent feedback at all levels)
Student assessment	**Standardised testing**	**Different types of assessments used for different purposes**
Role of students	Learning by listening to directions of teachers with **emerging student autonomy**	Active participant with both **student agency and co-agency** in particular with teacher agency

Note: For an animated version of this information visit www.youtube.com/watch?v=9YNDnkph_Ko

Source: *OECD Learning Compass 2030: A Series of Concept Notes,* Table 2, p.14 (OECD, 2019[12]; OECD Education and Skills YouTube channel, 22 October 2019[13])

Curriculum re-design for 2030

The OECD Learning Compass 2030 is neither an assessment framework nor a curriculum framework. To successfully foster the competencies it sets out, education systems will have to design future-oriented curricula that are appropriate and relevant to their local contexts. To support this, the second phase of the Education 2030 project has involved a rigorous international comparative analysis resulting in a series of six Education 2030 thematic reports on curriculum. This strand of activity also includes subject-specific curriculum analyses, with a 2019 report on physical and health education (OECD, 2019[4]) and a forthcoming report on mathematics curriculum document analysis (OECD, forthcoming).

Curriculum reform is one of the most politically sensitive and high-stakes reforms undertaken in education systems, and resistance to change is often much stronger than the desire to change. Curriculum is often viewed as "everyone's business", with many divergent opinions on what students should learn in school. Various interest groups have a stake in curriculum change, not only teachers and students who interact directly with the curriculum. Parents have aspirations for what their children should learn. Academic experts have views on what students should learn at what age, and universities have expectations for what students should be able to do when they graduate from school. Employers have expectations

for what people should be able to do when they enter the workforce, and politicians may have made election promises involving a particular curriculum change.

With so many interests at play, curriculum change is often considered a political battle (Alexander and Flutter, 2009[5]). Even a small suggested change such as increasing instruction time for a subject by one hour can be contentious, as there will be a loss elsewhere (decreasing instruction time by one hour for another subject). This view is rooted in the belief that **curriculum redesign is a zero-sum game within a given space.** A curriculum document is believed to somehow establish "political equilibrium" when it is legislated and therefore the status quo is often considered the safest option.

For every student to thrive in the future, a game changer is required, moving away from viewing curriculum redesign as a zero-sum game and seeking a **new win-win equilibrium**. To make this vision a reality requires a serious change of mindset.

- **First, all stakeholders should constantly ask themselves: "Who is the curriculum for?** They should be reminded to place students' needs, voice and agency, learning experiences and outcomes, as well as their well-being, at the centre of design principles for a curriculum change (see the section on design principles below). Keeping students' best interests at the heart of any curriculum redesign process should guard against seeking quick fixes and engaging in political battles and compromises. Decision makers should consider that taking no action has social and economic costs and significant consequences for students and society at large.

- **Second, all stakeholders should understand that a curriculum is a living and evolving tool.** A curriculum document itself maybe be considered static, but curriculum viewed more broadly is both dynamic and interactive. Curriculum creates interactions between the content to be covered and students (their backgrounds, their experiences and learning and well-being outcomes), teachers (their pedagogical and assessment decisions and practices), school leaders (their decisions on managing timetables), parents (their support at home) and others outside school (people in the community helping students to learn the curriculum contents in real world situations). This multidimensional and

multidirectional view of curriculum is rooted in the learning ecosystem approach to curriculum design. Curriculum change should be understood as part of a larger ecological change, for which managing the process requires a much more organic approach than top-down decision-making.

- **Third, as curriculum change can be one of the most politically costly forms of reform, policy makers may benefit from drawing on research evidence from a wide range of disciplines** (i.e. not only political science, but also neuroscience, behavioural economics and complexity science). Knowledge from these disciplines can, for example, provide insights for process management in curriculum change (e.g. how political conditions can change, causing a shift in equilibrium among stakeholders for a curriculum to meet students' needs today and for the future). Evidence-based research can contribute to mitigating and partly neutralising conflicts of interests, but the political economy perspective implies that political interests in reform processes can never be completely eliminated. It is, therefore, important to take the political economy perspective seriously when developing proposals on curriculum reform, to ensure that proposals are politically viable and well accepted by the major stakeholders in the education system.

What is curriculum?

No universal consensus exists on a definition of curriculum, and it is often a contested concept. Although curriculum may be very broadly defined as the totality of the learning experiences of students at school, it is, in fact, a complex, multidimensional phenomenon, and a more nuanced definition is necessary.

In recognition of this complexity, the Education 2030 definition of curriculum aims to be **inclusive** (covering both the formal curriculum and the hidden curriculum), **multilayered** (scoping different aspects of curriculum and covering both mandatory and non-mandatory curriculum content), and **dynamic, holistic and multidirectional** (taking an ecosystem approach to curriculum rather than a linear, industrial model).

Inclusive: Formal and hidden curriculum

A distinction can be drawn between formal curriculum and hidden curriculum. Hidden curriculum refers to the divergence between what students are explicitly and intentionally taught (the formal curriculum) and what they actually learn (Jackson, 1968[6]). The hidden curriculum represents the implicit or unspoken messages (academic, social or cultural) that are transmitted to students at school. These may include messages about power hierarchies and conformity or cultural beliefs about gender, race or people from other groups or communities.

Multilayered: Mandatory and/or non-mandatory

The scope and structure of content covered in curricula or curriculum frameworks can vary considerably across countries.

Common elements of curricula or curriculum frameworks include:

- educational goals/content
- guidelines on pedagogy
- guidelines on assessment.

Countries often produce a main document that sets out the basis of their curriculum. The scope of this main document varies by country, depending on national curriculum frameworks and structures. In some countries, this main document is supplemented by separate high-level documents containing, for example, assessment guidelines (Table 2). Countries/jurisdictions also vary with respect to which elements of curriculum are mandatory and which non-mandatory. All countries/jurisdictions listed in Table 2 have mandatory educational goals and content (presented in a main curriculum document or separate documentation). Northern Ireland (United Kingdom) also outlines some non-mandatory educational goals or content in separate documentation.

Far fewer countries/jurisdictions make pedagogical or assessment guidelines mandatory.. Guidelines on assessment are mandatory only in Denmark, Estonia, Ontario (Canada) and Norway. Only Costa Rica has mandatory guidelines on pedagogy.

It is important to note that approaches followed by countries/jurisdictions are not mutually exclusive. For example, they can choose to combine mandatory and non-mandatory guidelines for assessment within their curriculum, as in Ontario (Canada).

Table 2. **General structure and scope of curricula across countries**

	Included in the main curriculum document		Included in a separate document	
	Mandatory	**Non-mandatory**	**Mandatory**	**Non-mandatory**
Educational goals and content	**OECD:** Australia, Chile, Czech Republic, Denmark, Estonia, Finland, Hungary, Ireland, Japan, Korea, Mexico, Northern Ireland (United Kingdom), Norway, Ontario (Canada), Poland, Portugal, Québec (Canada), Sweden, Scotland (United Kingdom), Netherlands, Turkey, Wales (United Kingdom), **Partner:** Brazil, China, Costa Rica, Hong Kong (China), India, Kazakhstan, Russian Federation		**OECD:** Australia, British Columbia (Canada), Chile, New Zealand, Portugal, Québec (Canada), Turkey, **Partner:** Argentina, Hong Kong (China), Russian Federation	**OECD:** Northern Ireland (United Kingdom)
Guidelines on pedagogy	-	**OECD:** Estonia, Finland, Mexico, New Zealand, Ontario (Canada), Portugal, **Partner:** Hong Kong (China), Kazakhstan	**Partner:** Costa Rica	**OECD:** Australia, Chile, Denmark, Ireland, New Zealand, Northern Ireland (United Kingdom), Norway, Ontario (Canada), Turkey, **Partner:** Argentina, Hong Kong (China), India
Guidelines on assessment	**OECD:** Estonia, Ontario (Canada)	**OECD:** Estonia, Finland, Japan, Mexico, New Zealand, Northern Ireland (United Kingdom), Turkey, **Partner:** China, Hong Kong (China), India, Kazakhstan, Russian Federation	**OECD:** Denmark, Norway, Ontario (Canada)	**OECD:** British Columbia (Canada), Hungary, Japan, Korea, New Zealand, Scotland (United Kingdom), **Partner:** Argentina, Costa Rica, Hong Kong (China)

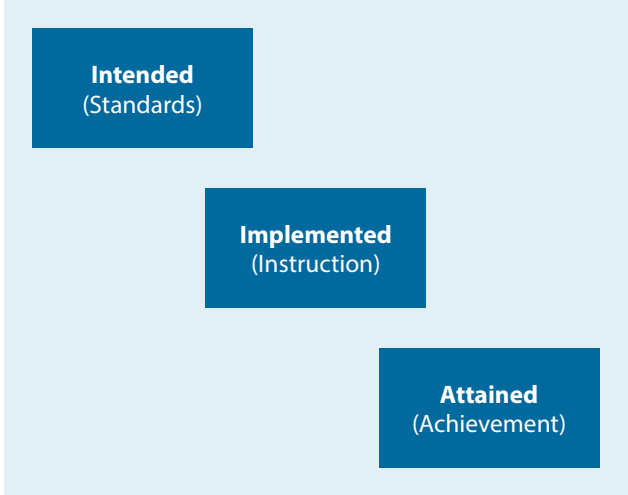
Source: Data from the Policy Questionnaire on Curriculum (PQC).

Dynamic, holistic, and multidirectional: Written, taught, attained and more

Traditionally, analytical approaches to curriculum have focused on three main aspects of curriculum (Travers and Westbury, 1989; Schmidt et al., 1996) (Figure 3):

- **The intended (or written) curriculum** refers to the official expressions found in government documents that identify what students are set to learn and to become and how they are to act. Typically, these are curriculum standards or guides published by education ministry departments or their equivalent. Textbook publishers often rely on these official documents to turn standards into lessons and accompanying exercises for students that may be used in classrooms.
- **The implemented (or taught) curriculum** refers to how the curriculum is enacted in the classroom. Teachers interpret the curriculum content and standards, often drawing upon textbooks and other curricular resources, to shape educational experiences, including learning and well-being, for and with students.
- **The attained (or achieved) curriculum** refers to what students are able to demonstrate that they have learned. The attained curriculum can be thought of as the end product of intended and implemented curriculum.

Figure 3. **Traditional curriculum analysis framework – tripartite model**

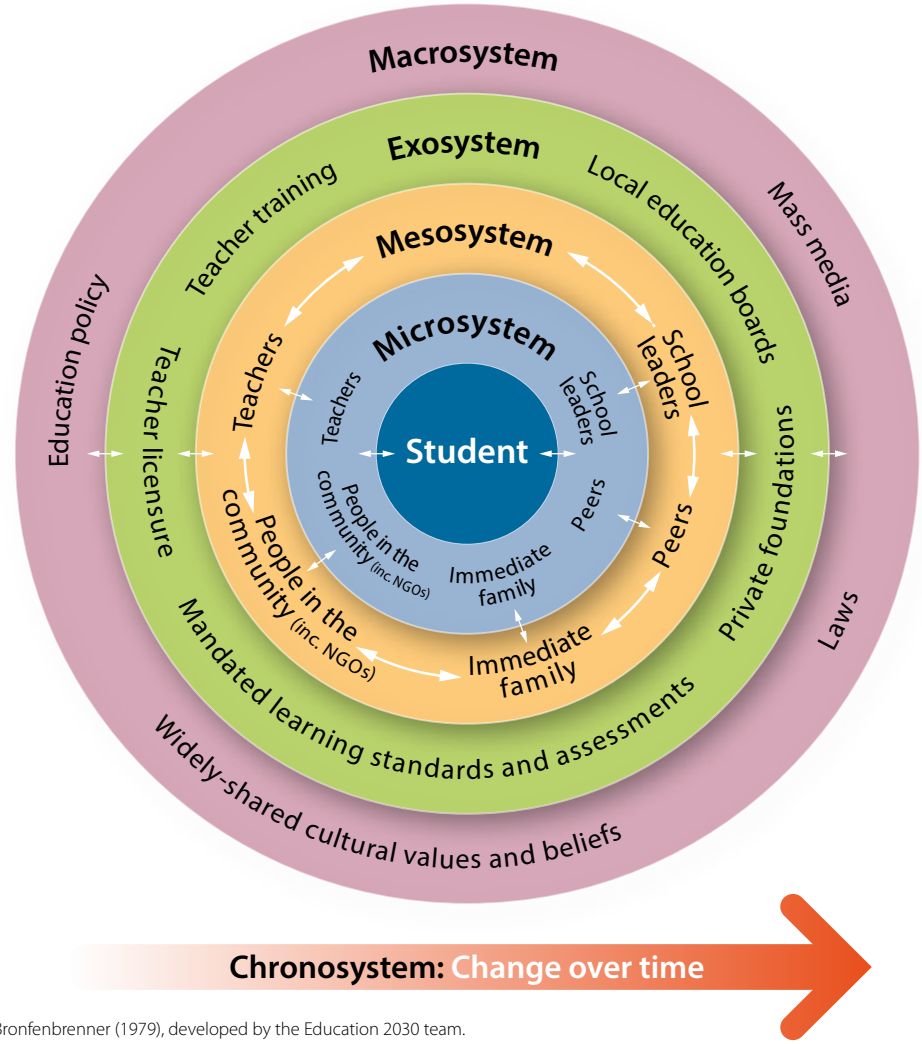


Source: Schmidt et al., 1996.

*The Education 2030 approach to curriculum analysis aims to be **inclusive, multilayered**, and **dynamic, holistic and multidirectional**.*

The OECD E2030 curriculum analysis has built on and extended this model, developing an ecological systems approach to curriculum analysis that recognises the multiple stakeholders involved in curriculum and the interactions between them (Bronfenbrenner, 1979[7]). The E2030 ecosystem approach to curriculum analysis conceptualises an individual's environment as multiple nested systems that directly and indirectly impact their development throughout life. It acknowledges the complex reality that curriculum involves multidirectional interactions among schools, teachers, students, families, the community and society more broadly (Figure 4).

Figure 4. **The Education 2030 ecosystem approach – multiple nested systems**



Source: Adapted from Bronfenbrenner (1979), developed by the Education 2030 team.

Microsystem

The microsystem represents the context closest to a student, encompassing interpersonal relationships and direct interactions with immediate surroundings (e.g. school, home, neighbourhood). In the context of teaching and learning of an intended curriculum, these interactions largely take place at the classroom level, in the form of students' interactions with and learning from their teachers, their peers, learning activities and materials, assessments and other channels through which students engage with the curriculum. Students may also interact with the curriculum during extracurricular and other out-of-school activities with people in the community or in the family/home environment.

Mesosystem

The mesosystem includes interactions between various aspects of the microsystem. For example, within the school context, this includes how teachers in different classrooms connect with one another, how school leaders facilitate interactions with teachers, families and the broader school community, and also how teachers connect with families, as these relationships may influence the student's microsystem. Through these interactions, teachers may come to understand the meaning of curriculum. How they subsequently operationalise it in the classroom is shaped by the social contexts in which they are situated. This may change the way in which teachers interact with their students. As a result, students may learn more effectively, with a sense of purpose as well as a sense of feeling safe with their teachers. Furthermore, what actually gets implemented in classrooms is influenced by how school leaders communicate the meaning and importance of a new curriculum and how they intentionally create opportunities for teachers to collaborate around teaching it. Finally, when teachers and school leaders build bridges between home and school, through culturally responsive, two-way channels of communication with families, students see the relevance of the curriculum and receive support from family members to achieve curriculum goals.

Exosystem

The exosystem encompasses aspects that give structure to the microsystem, but it does not directly affect students. For example, curriculum design involves school, municipality, state/provincial/regional, and national levels, depending on the types of autonomy countries give to these entities. All of these levels of government are part of the exosystem because they each have jurisdiction over aspects of education that directly impact the guidelines, training, time and instructional materials that teachers have at their disposal to enact a curriculum, which in turn impacts students. Examples include mandated learning standards and assessments, teacher licensing and evaluation requirements, recognition programmes, and funding, through budget items and grants for staffing, resources, and professional development. External organisations (e.g. universities and non-governmental organisations) are also part of the exosystem alongside agencies, as they too indirectly impact how students engage with curriculum, by providing teacher training, instructional materials, grants and technical support to assist in implementation. Outside school, the exosystem can also involve factors such as a student's parent losing their job, as that may affect whether the student will have parental support for homework or a place to study at home.

Macrosystem

The macrosystem, the outermost layer, includes social or cultural ideologies and beliefs that affect a student's environment. For example, it includes broader societal and cultural beliefs about the purpose or goals of education. These beliefs, which can vary widely within countries and can be hotly contested, strongly influence what is taught and how it is taught (Spring, 2010). They may be transmitted or reinforced through mass media or social media. Many questions may be debated. Should schools focus on preparing students for success on entry exams to higher education institutions? Should they address holistic cognitive, social, emotional and physical dimensions of learning? Should they serve as socialising agents to forge a national identity? Should they train students for jobs in a knowledge-based economy? Such beliefs about the purpose of schooling are reinforced both covertly and overtly throughout the education system, in policy documents, curricular content that teachers choose to teach, and high-stakes assessments.

Chronosystem

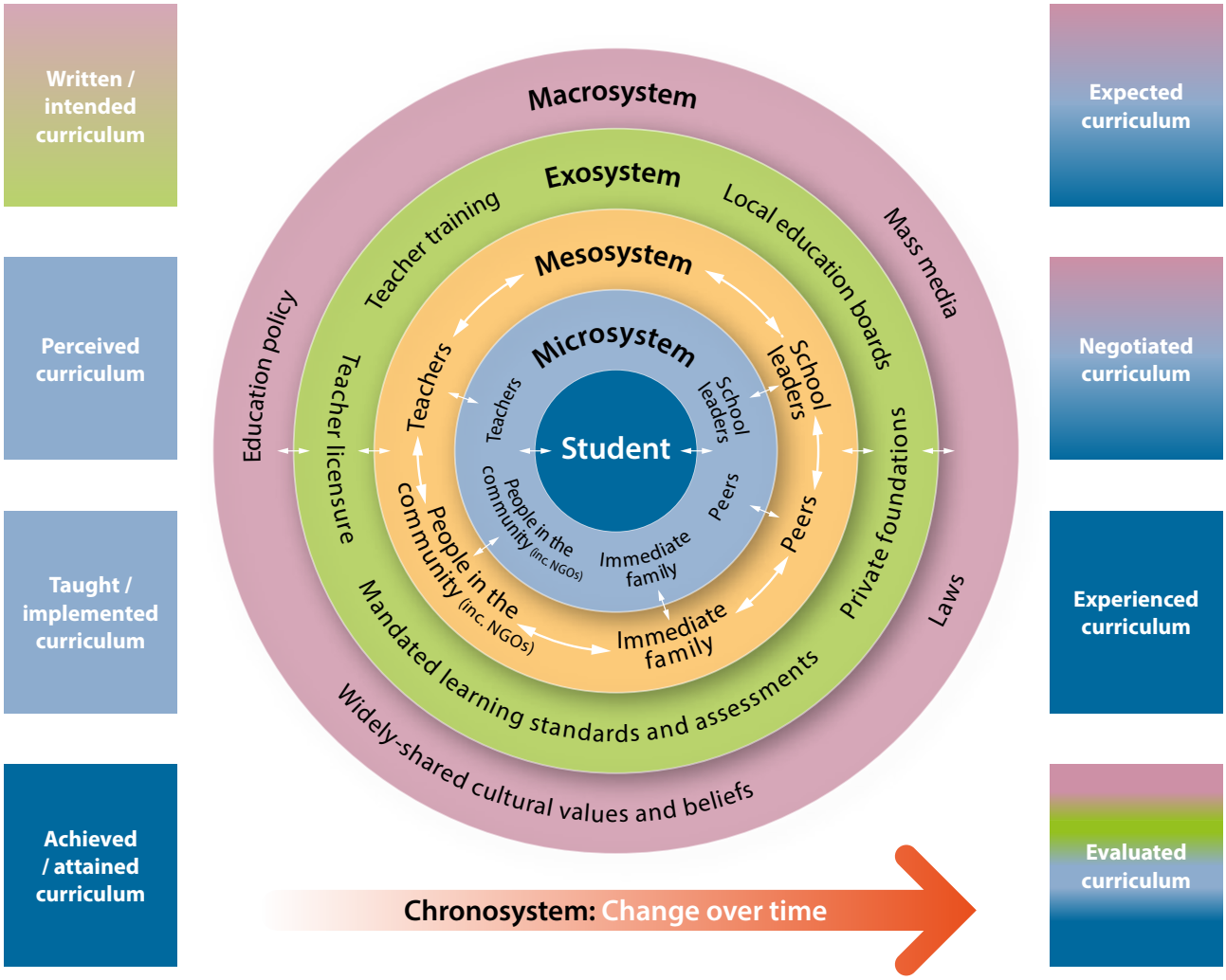
The chronosystem identifies the points of time in the implementation process when specific activities are to take place. Examples of such points include: before a new curriculum is officially passed or mandated; the year after a curriculum change is adopted; three years after a curriculum change is adopted; and a decade after a curriculum change is first introduced. The chronosystem also refers to how relationships or interactions within or across systems change over time. For example, student-teacher relationships may change over the years or in response to individual life events (e.g. changing grades or schools) or to local, national or global events (such as the COVID-19 pandemic).

It is important to reiterate that students constantly interact with these systems, and both students and their environments constantly affect one another. In addition to directly and indirectly impacting how students experience implementation of a new curriculum, the nested levels in the educational system interact with each other (Neal and Neal, 2013[8]).

The multidirectional arrows in Figure 5 depict the interactions among system levels. Interactions between systems are not necessarily hierarchical (Datnow, 2005[9]). For example, beliefs about the goals of public education (the macrosystem) might directly impact the content that a teacher decides to cover in class (the microsystem), without filtering through the exosystem and mesosystem. How these levels influence one another is also multidirectional.

Mapping onto the ecosystem approach to curriculum change, the OECD E2030 curriculum analysis looks at eight aspects of curriculum (Figure 5). In addition to the three traditional aspects of curriculum (intended, implemented and attained), the following five dimensions are considered important for ensuring student learning and well-being:

Figure 5. **The Education 2030 ecosystem approach to curriculum analysis**



Source: Adapted from Bronfenbrenner (1979), developed by the Education 2030 team.

- The **expected curriculum** refers to the expectations and beliefs of stakeholders (including parents, students, teachers, school leaders, employers and other community members) around how an intended curriculum should look, what students are to learn, what they should be able to become and how they should act.
- The **negotiated curriculum** refers to the process of negotiation between policy makers, teachers, and students before the curriculum is implemented and taught.
- The **perceived curriculum** refers to how schools readers and teachers perceive the curriculum and what they interpret or understand from the curriculum.
- The **experienced curriculum** is the curriculum as perceived and actually experienced by students, while the **assessed curriculum** refers to the learnings identified through assessment practices designed to capture a subset of student learning. Although these two curricula should be similar, what is experienced and what is assessed are not always identical.
- The **evaluated curriculum** constitutes the overall assessment design and implementation of the curriculum, including monitoring and evaluation. It occurs over time and involves multiple stakeholders, including administrators, teachers, parents and others in a process of understanding the life cycle of the curriculum design process.

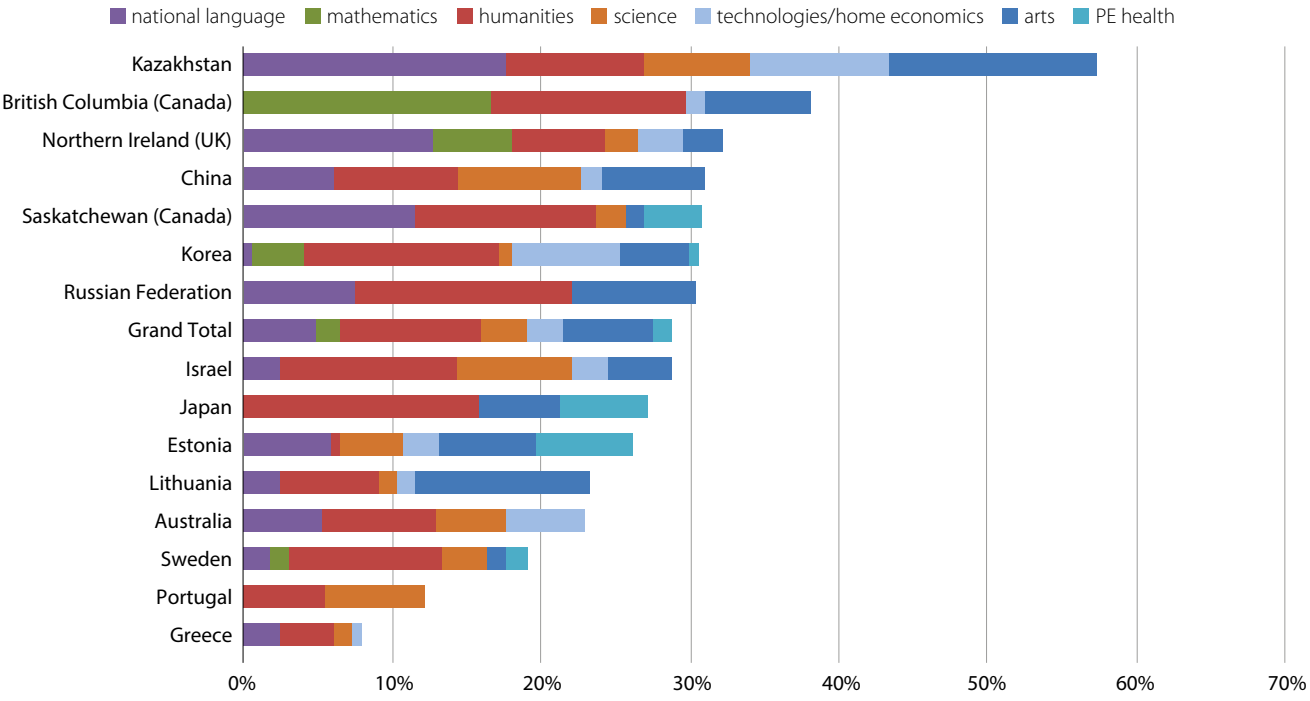
The various dimensions of curriculum are not always in alignment, leading to disconnects and unintended consequences. The following subsections draw on data from Education 2030 and PISA 2018 on global competence to provide illustrative of this.

Intended curriculum vs. attained curriculum

Wide gaps can exist between what is intended by curriculum designers and what is actually experienced and attained by students. As an example, Kazakhstan targets "global competency" prominently in its written, **intended curriculum** in lower secondary school (Figure 6), while at least one aspect of the **attained curriculum** (i.e. the students' performance in the PISA global competence cognitive test) is among the lowest of participating

Figure 6. **Global competency in the written (intended) curriculum**

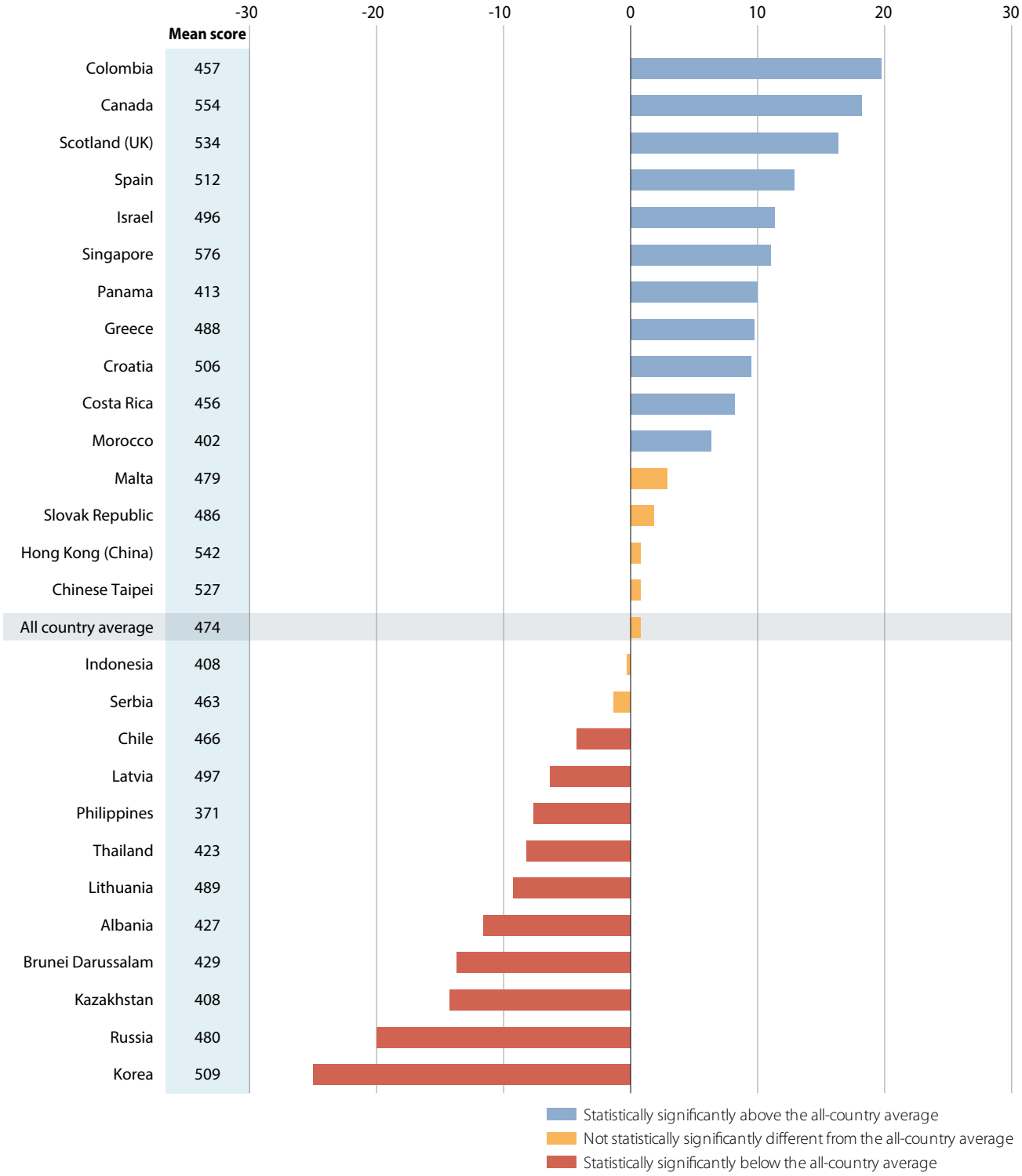
Percentage of content items in the overall mapped curricula targeting competency (as main or sub target) and distribution by learning area



Source: Data from the E2030 Curriculum Content Mapping exercise.

Figure 7. **Relative performance in the PISA Global Competence cognitive test, after accounting for students' performance in reading, mathematics and science**

Score-point difference between actual and expected performance in global competence



Note: Countries and economies are ranked in descending order of the relative performance in global competence.

Source: OECD, PISA 2018 Database, Table VI.B1.6.1.

Wide gaps can exist between what is intended by curriculum designers and what is actually experienced and attained by students.

countries and economies (Figure 7). Differences can be observed in the other direction, too. Greece targets global competency only in a small percentage of content items in its written curriculum, but its students score relatively well on the PISA global competence cognitive test.

Discrepancies such as these are concrete reminders that curriculum exists in a complex reality as it is appropriated by different players at every level of its delivery chains, in a connected-autonomy fashion (Fullan, 2015[10]). Contextual variations also are at play, not only across countries and schools, but also across students. Comparisons of findings should therefore keep this larger picture in mind. Specifically, comparison of the intended curriculum (actual document data from governments on official curriculum) with one aspect of attained curriculum (students' performance on a cognitive test) must take into account important distinctions related to different levels of these delivery chains. The instruments used for eliciting the data above on global competency, for instance, differ in focus, scope and purpose. Although they are highly related conceptually, they are not directly comparable. For example, the definitions adopted for the two studies differ:

- In the **OECD E2030 Curriculum Content Mapping (CCM)** exercise, global competency involves having and using skills, understanding and dispositions that extend beyond one's own cultural, national, or ethnic background. It means being aware of global connectedness and interrelatedness, having a global scope of empathy for human fate around the world, having a sense of belonging to a global humanity, and not fearing cultural diversity (see Curriculum Content Mapping description in the Technical Report: Curriculum Analysis of the OECD Future of Education and Skills 2030)[1].

- In **PISA**, global competence is defined as a multidimensional capacity that encompasses the ability to: 1) examine issues of local, global and cultural significance; 2) understand and appreciate the perspectives and world views of others; 3) engage in open, appropriate and effective interactions across cultures; and 4) take action for collective well-being and sustainable development. (OECD, 2020[11])

1. https://www.oecd.org/education/2030-project/contact/Technical_report_Curriculum _Analysis_of_the_OECD_Future_of_Education_and_Skills_2030.pdf

The E2030 CCM data describe the extent to which "global competency" (knowledge, skills, attitudes and values) is targeted across content items in the lower secondary curricula in participating countries, whereas the attained curriculum data (Figure 7) refer exclusively to the cognitive dimensions (knowledge and cognitive skills) of PISA global competence. PISA student questionnaires also cover social skills and attitudes, in addition to knowledge and cognitive skills. PISA results acknowledge the potential influence of other contextual factors beyond the control of schools, such as parents' awareness of global issues and interest in learning about other cultures, as discussed later.

To identify the disparity in curriculum between ideas **(intended curriculum)** and reality **(attained curriculum)** and further establish complexities or multiple realities of curriculum, further triangulation also requires:

- Surveying school principals – **perceived curriculum**
- Surveying teachers – **perceived/taught curriculum**
- Surveying students' views about their experiences – **experienced/ perceived curriculum**

Triangulation allows governments to establish the multiple realities of how a curriculum is intended, designed, interpreted, enacted, experienced and achieved. It also supports identifying where the delivery chain gets broken and, ultimately, helps to mend the broken connections between what is intended and what is actually learned by students. Finally, it helps to build a solid knowledge base on curriculum design and implementation. Curriculum redesign can be a political battleground, involving sensitive issues that require negotiation between political entities, subject-expert groups, teachers, parents and students, as well as a degree of informed trade-offs between those educational stakeholders (Alexander and Flutter, 2009[5]; Kärner et al., 2014[12]). Having a solid evidence base can support countries and schools in making informed curriculum decisions rather than being vulnerable to political or ideological fluctuations.

Intended curriculum vs. attained curriculum vs. experienced/ perceived curriculum

When comparing the **intended curriculum** to students' self-reported data about their experience **(experienced/ perceived curriculum)** of specific dimensions of global

Teaching global competency may involve a variety of activities meant to increase students' holistic understanding of themselves and their surroundings...

competence in PISA, more nuanced results emerge. For example, students in Kazakhstan who score poorly in the cognitive test report greater levels of awareness of global issues (e.g. climate change, migration, poverty and gender inequality) than the OECD average (OECD, 2020[11]).[2] Conversely, students in Greece performed well on the cognitive test (Figure 7) while in their self-reported data only a small proportion display an ability to understand the perspective of others, compared to students in other countries (OECD, 2020[11]).[3]

In these two countries, these two dimensions of the students' self-reported data (awareness of global issues and perspective taking) are more in line with the CCM findings on intended curriculum than the scores on the PISA cognitive test. On the other hand, data on students' agency regarding global issues confirms the pattern observed in the cognitive tests: students in Kazakhstan are low on the "agency" dimension while results of those in Greece are better than expected given the intended curriculum in their country (OECD, 2020[11]).[4] These findings underline the fact that influences beyond the intended curriculum play an important role in shaping young people's knowledge, skills, attitudes, and values when it comes to global competence, perhaps linked to other layers of the learning ecosystem in which curriculum exists. This includes, for example, how students' perception (self-reported data) may be affected by the expectations of their parents and/or teachers.

Intended vs. perceived/implemented curriculum

To minimise gaps between intended and attained curriculum, examining potential disconnects between the **intended curriculum** and the **perceived/implemented or taught curriculum** also deserves careful attention, as they may reveal areas for potential intervention.

Teaching global competency may involve a variety of activities meant to increase students' holistic understanding of themselves and their surroundings, not only student knowledge of global issues. Students may be encouraged to reflect on and demonstrate a range of related skills, attitudes and values (how they take action to support their local communities or to protect the planet, how they show respect for peers of different linguistic, social or cultural background, how they support others in learning, etc.).

Other important factors that can influence the implemented curriculum include how much autonomy is given to teachers to adapt it to their local needs and how flexible the curriculum is, or to what extent curriculum is aligned with other elements, e.g textbooks, teacher preparation, etc. which can, among other factors, influence teaching.

In these complex realities, the intended curriculum is often misunderstood as a document that simply suggests what to teach/learn. However, it can influence not only what but also how teachers teach and students learn. In the case of global competence, for instance, how school leaders and teachers interpret and perceive the intended curriculum also may make a difference.

In the **intended curriculum**, global competencies are articulated into curriculum as a stand-alone subject or included as a cross-curricular theme or competencies (e.g. in humanities, national languages, science, the arts). When a cross-curricular approach is taken, different subject teachers are **intended/expected** to collaborate, so that students have greater and synergetic opportunities to develop such competencies in different contexts, which supports deeper learning (Goodlad and Su, 1992[13]).

In reality, however, teacher collaboration can be one of the areas in need of change. Findings from TALIS 2018 indicate that while teachers across OECD countries and economies frequently participate in more shallow types of exchange and co-ordination (such as exchanging teacher materials and discussing the learning progression of individual students), they participate much less frequently in deeper forms of collaboration such as team-teaching and engaging in joint activities across different classes (OECD, 2020[14]). For this, school leaders are **intended/expected** to facilitate such collaboration among teachers, support teacher agency and prepare enabling conditions for teachers to do so.

2. Figure VI.2.1. Students' awareness of global issues, https://doi.org/10.1787/888934169310
3. Figure VI.3.1. Students' ability to understand the perspective of others, https://doi.org/10.1787/888934169538
4. Figure VI.5.1 Students' agency regarding global issues, https://doi.org/10.1787/888934170070

Curriculum within and beyond school walls: A learning ecosystem framework

In summary, a learning ecosystem framework can help enrich the understanding of curriculum as a policy lever, but also as a living, dynamic and evolving tool. Triangulation of data from interacting parts of this ecosystem can help shed light on how students develop global competencies in a holistic way, beyond the written curriculum:

- **Microsystem:** Students develop global competences through their own learning experiences in various contexts, through formal and non-formal learning in and outside of school, as well as informal learning at home or in communities. This suggests that teachers are increasingly expected to take an ecosystem approach to design the best possible learning environments for their students, considering the different resources each of them may have.

- **Mesosystem:** The development of global competencies may be influenced by the quality of interactions in multiple directions:
  - Between students and a teacher;
  - Among students themselves;
  - Between students and their parents at home. PISA data show positive associations between students' and parents' awareness of global issues[5], interest in learning about other cultures[6] and attitudes towards immigrants[7] (OECD, 2020[11]);
  - Between students and the community and wider society. In general, PISA data also show positive associations between the students having contact with people from other countries in their family, circle of friends, neighourhood or at school and students' intercultural skills and attitudes towards global issues (OECD, 2020[11]).[8]

- **Macrosystem**: The development of global competencies may be influenced not only by what is included in the curriculum, but also how the intended curriculum is written. It is also influenced by school ethos or parental attitudes and values. These are shaped by and, in return, shape cultural norms, beliefs or values that are then transmitted to children through parents' modelling of attitudes (e.g. interest in learning about other cultures), knowledge (e.g. awareness of global issues) and behaviours (e.g. treating those from different cultures with tolerance and respect).

Taken together, these findings from Education 2030 and PISA 2018 highlight clearly that any comprehensive curriculum analysis should not focus solely on investigating the content of written curricula, but must also consider the multiplicity of interacting factors that influence student outcomes, as well as experiences leading to these outcomes. The Education 2030 series of thematic reports on curriculum (re)design adopts such a holistic, multidimensional, ecosystem approach to curriculum design and implementation processes.

What issues are at stake?

Recognising that curriculum reform can be a politically charged process, the series of thematic reports arising from the curriculum analysis were produced to correspond six issues facing policy makers and curriculum designers: what students learn matters (21st century curriculum); curriculum overload; curriculum flexibility and autonomy; equity through curriculum innovations; values and the curriculum; and an ecosystem approach to curriculum redesign and implementation. The first two reports will be published in late 2020, with the four other reports to follow in 2021.

2020 reports

1. What Students Learn Matters: Towards a 21st Century Curriculum

Economic, societal and environmental changes are happening rapidly, and technologies are developing at an unprecedented pace, but education systems are relatively slow to adapt. Trends in the types of skills required in the labour market have shifted dramatically over recent decades. While routine manual and cognitive tasks were once the norm, many of today's jobs require non-routine analytic and interpersonal skills. Building

5. Figure VI.2.5 Students' and parents' awareness of global issues, https://doi.org/10.1787/888934169386
6. Figure VI.3.4 Students' and parents' interest in learning about other cultures, https://doi.org/10.1787/888934169595
7. Figure VI.3.13 Students' and parents' attitudes towards immigrants, https://doi.org/10.1787/888934169766
8. Figure VI.4.6 Contact with people from other countries, and attitudes towards global issues, https://doi.org/10.1787/888934169918

a peaceful and sustainable future requires education systems to foster a range of competencies that go beyond preparing students for jobs.

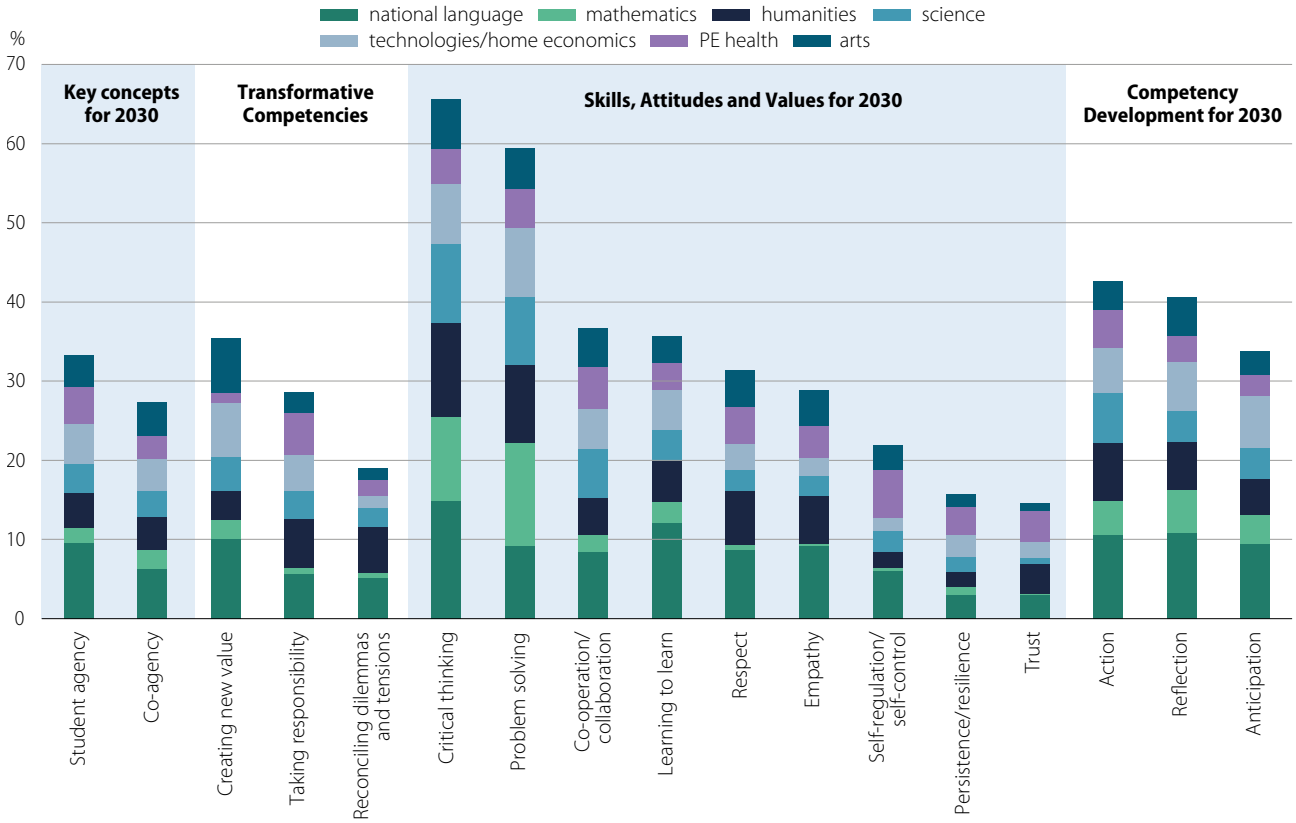
Education systems may need to reform their curricula in order to foster these 21st century skills in students. People increasingly need social and environmental awareness, as well as the ability to co-operate, negotiate and find creative solutions to new and old problems. These realities are key drivers for change in transforming education for a better world. That the content of today's curriculum lags behind evolving societal needs is a major challenge experienced by countries/jurisdictions that are keen to adequately prepare students to shape their future and thrive.

Agency and co-agency are the key concepts underpinning 21st century competencies. These are defined as the ability, will and belief of people to positively influence their own lives and the world around them. Both key concepts are highlighted in many content items across countries/jurisdictions, with student agency (33%) and co-agency (27%) more pronounced in learning areas such as national language, humanities and technologies/home economics (Figure 8).

However, these two central concepts are taken up to a lesser extent in curricula than cognitive skills (critical thinking is present in 66% of the mapped curricula and problem-solving in 59%). These skills are embedded in almost all subject areas, suggesting that they are

Figure 8. **21st century competencies and key concepts in curricula**

Percentage of content items in the overall mapped curricula targeting each competency (as main or sub-target) and distribution of learning area – *on average across countries / jurisdictions with available data*



Note: The averages include OECD countries/jurisdictions and partner economies participating in the Curriculum Content Mapping exercise. OECD countries and jurisdictions: Australia, British Columbia (Canada), Saskatchewan (Canada), Estonia, Greece, Israel, Japan, Korea, Lithuania, Northern Ireland (United Kingdom), Portugal and Sweden. Partner countries: China, Kazakhstan and the Russian Federation.

Source: Data from the Curriculum Content Mapping exercise.
Information on statistical data for Israel: http://dx.doi.org/10.1787/888932315602.

StatLink: Please see attached Excel file, a StatLink will be generated with the publication

considered highly transferrable across learning areas. Although agency and co-agency are also transferable concepts, some subject teachers report that it is harder for them to feel adequately prepared to foster agency in learning areas such as mathematics than in social sciences.

The meta-cognitive skill, learning–to-learn, is also included in all areas, but to a lesser extent (36%). Considering that "learning-to-learn" is applicable to any subject or transferable to non-school environments as a lifelong learner, it could be made more explicit in curriculum.

Attitudes and values are also included in curriculum, but to a lesser extent. For example respect (31%) is included in areas such as national language and humanities and trust (15%) in humanities and PE health.

Among transformative competencies, creating new value is present more frequently (35%) than others and is often mapped in areas such as national language, arts and technologies/home economics. Taking responsibility (29%) and reconciling tensions (19%) are most often present in areas such as national language and humanities.

Anticipation, action and reflection are embedded in almost all areas, suggesting that they are considered transferable competencies. However, anticipation, which is increasingly becoming an important competency to manage uncertainty, is articulated to a lesser extent (34%) than action (43%) and reflection (41%).

2. Curriculum Overload: A Way Forward

Attempting to keep curriculum aligned with newly emerging needs of the economy and society can lead to a situation where curriculum becomes overloaded. The more policy makers try to accommodate the demands from various sectors or interest groups, the greater the risk of creating an overcrowded curriculum, particularly if there is inadequate consideration at the curriculum design stage of what is included, what is removed, and why. Overload may lead to narrow, fragmented or distorted ways of implementing curriculum, with consequences for the quality of student learning. A decrease in well-being of both teachers and students is likely if they are required to work and study extensively outside of school hours to meet new curriculum requirements.

To accommodate emerging demands without further overloading curriculum by creating new subjects, many countries/jurisdictions have taken the approach of translating new or emerging societal needs into cross-curricular themes that are then embedded into existing subjects.

One of the most pressing of these needs, reflected in the United Nations Sustainable Development Goals, the OECD Green Growth agenda and the increasingly widespread emphasis on environmental, social and governance analysis, is that of "environmental education and sustainability". This was the most frequently reported cross-curricular theme reported by participating countries/jurisdictions (Figure 9).

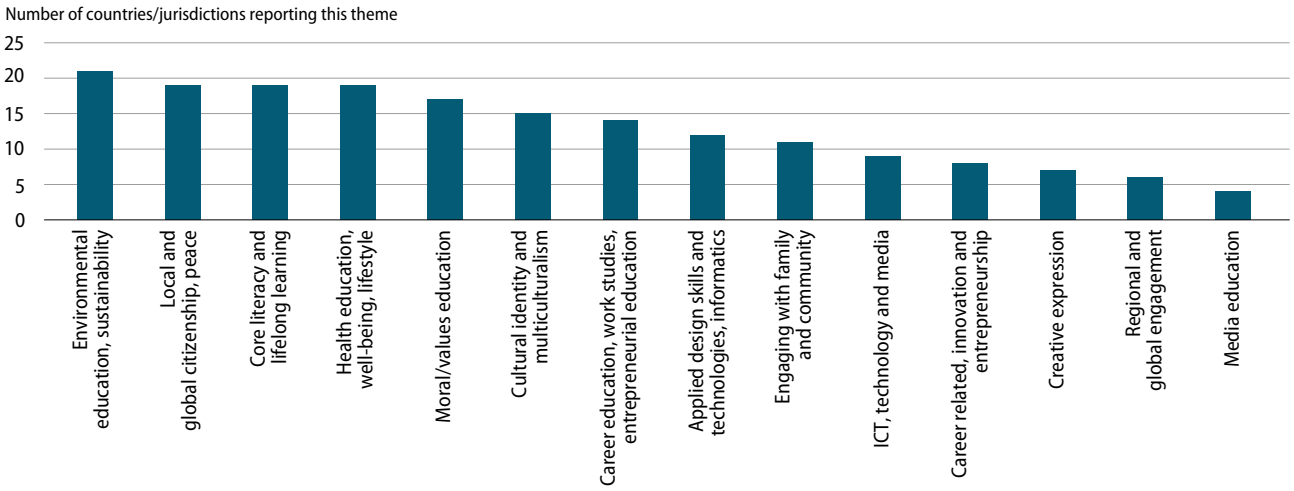
There is also growing awareness of the importance of preparing students to live in an increasingly globalised and interconnected world. Indeed, promoting peace and sustainable development through education is now enshrined in United Nations Sustainable Development Goal 4, Target 7. Furthermore, global competency is widely recognised as an important tool for navigating the 21st century. Assessment frameworks such as the global competence framework of PISA (discussed above) have explored this concept to support the quality, equity and effectiveness of educational systems to create a shared respect for human dignity (OECD, 2020[11]). The second most frequent cross-curricular theme embedded into the curricula of participating countries/jurisdictions was "local and global citizenship, peace".

Cross-curricular themes are also used to promote holistic development of students, beyond traditional learning. This is articulated through cross curricular themes like "health education, well-being, lifestyle" or through value based themes like "moral/values education" and "cultural identity and multiculturalism".

Other potential strategies for addressing curriculum overload include:

- regulating learning time
- carefully defining the pitch of what is included in curriculum
- building in coherent learning progressions across grades and education levels

Figure 9. **Types of cross-curricular themes reported by countries/jurisdictions**



Note: Values displayed include only countries/jurisdictions with responses that could be clearly coded as yes/no. Ordered in descending order of number of countries/jurisdictions reporting this theme.

Source: Data from the PQC, item 1.1.2.4.

StatLink: Please see attached Excel file, a StatLink will be generated with the publication

- focusing on conceptual understanding or "big ideas" to avoid an excessive number of subjects or topics within the allotted time
- managing perceptions of overload by adjusting the size and/or format of curriculum documents (OECD, 2020[15]).

Forthcoming reports

3. Equity through Curriculum Innovations (title to be confirmed)

The types of curriculum innovation that may promote equity include personalised curriculum, digital curriculum, cross-curricular or competency-based curriculum, and flexible curriculum.

While there is a risk that curriculum design can lead to or compound inequities, there is also much potential for curriculum to help increase fairness, justice and inclusion for all students. Research on individual differences, particularly on disparities in learning and access related to students with special education needs and students of lower socio-economic backgrounds, suggests that curriculum design approaches can be leveraged to respond to the needs of diverse students.

In this regard, Universal Design for Learning is a commonly applicable principle to remove barriers for all types of learners, e.g. around the **what** (content), the **how** (goal-setting, strategies and skills) and the **why** (motivation) of learning, so as to foster motivated, self-directed and lifelong learners (Figure 10).

4. Curriculum Flexibility and Autonomy (title to be confirmed)

Curriculum flexibility and curriculum autonomy are two sides of the same coin. Curriculum flexibility is conceptualised as adaptability and accessibility of the curriculum for schools and teachers to respond to students' needs and capabilities. It assumes autonomy of schools and teachers with regard to the curriculum or parts of it (Saarivirta and Kumpulainen, 2016[16]; Newton and da Costa, 2016[17]). Curriculum autonomy is the autonomy of local authorities, schools and teachers to make decisions and have responsibility over the curriculum domain for planning and organising teaching and learning. It also suggests an amount of autonomy on the part of students, who can have autonomy in designing and selecting their curriculum, notably during secondary school. Student agency and co-agency between students, teachers, parents, and the community can be a critical part of learning as students navigate educational systems.

Granting autonomy in this way is not without risk, however, and striking the right balance is an issue facing many countries/jurisdictions. One of the main challenges associated with devolving autonomy to schools to adapt the curriculum in a flexible way is

Figure 10. **Universal design for learning**

Universal design for learning	
The what of learning (content)	Provide various means of representation (e.g. text, visuals, multimedia, the language of the learner, adaptive digital materials and tools). This is the representation principle. It targets the physical, perceptual and cognitive barriers that might get in the way of learning for students with diverse needs.
The how of learning (goal-setting, strategies and skills)	Provide multiple ways for students to demonstrate what they know. This is the action and expression principle. It has direct implications for how to design assessment and examinations (e.g. beyond written text or standardised formats).
The why of learning (motivation)	Provide multiple means of engagement. This is the engagement principle. Curriculum designers can make learning more engaging by adapting to learners' interests, valuing learners' curiosity, building in a sufficient level of challenge and making learning interactive and dynamic.

Source: CAST (Centre for Applied Special Technology) (2018[18]), Universal Design for Learning Guidelines, Version 2.2.

the risk that teachers will interpret the curriculum in widely different ways and, in doing so, may generate vastly fragmented and even contradictory applications of the curriculum at the classroom level. Students then may experience inconsistent curricula across or even within schools, raising concerns about the impact of curriculum flexibility on equity. Moreover, the enactment of curriculum flexibility in practice depends on how teachers and schools use their autonomy. Building a culture of trust and self-evaluation between national authorities, schools and teachers will be an essential step to realise curriculum flexibility.

5. Values Embedded in the Curriculum (title to be confirmed)

Embedding attitudes and values into curriculum refers to explicitly recognising their importance as part of a holistic education, beyond knowledge and skills, to support and guide students in navigating an uncertain future (OECD, 2019[1]). As countries are increasingly moving towards a holistic approach to competency development, there are growing expectations for schools to address values to enrich students' learning experience and their school life.

However, embedding values in curriculum is a highly contested issue, resulting in political, philosophical and ideological debates. Including values in curriculum requires a clear decision-making process to identify and select shared values that support the overall mission and goals of the curriculum. This obviously raises questions about which values – and whose values – to include in, or exclude from, curriculum and how to balance these choices in the context of multicultural societies with evolving value systems.

6. Ecosystem Approach to Curriculum Redesign and Implementation (title to be confirmed)

Decades of research on the efficacy of curricular reforms has found that implementation dictates outcomes (McLaughlin, 1990[19]). Moreover, assessments, particularly high-stakes assessments, have an impact on what is taught and, ultimately, on what and how students learn. Curriculum implementation is a complex process at the intersection of multiple policy dimensions, a range of people and diversity of places (Honig, 2006[20]) – ideally linked in an ecosystemic way, building on a co-agency approach.

Education systems are increasingly considered part of a larger ecosystem to which they contribute and by which they are influenced (Figure 5). In line with this shift, a sense of shared responsibility for the education system and stakeholder engagement is evolving, with the aim that decision-making will no longer be controlled by a select group of people, but will rather be shared among stakeholders of the education system (e.g. parents, employers, communities and students). All stakeholders are increasingly working together and assuming responsibility for each student's education, including the student. Rather than being acted upon by the education system, students are becoming active participants and change agents in the system alongside teachers and principals and taking on increasing responsibility for their own learning.

If curriculum designers fail to consider how curriculum will be interpreted and enacted by others, there will be a wide gap between what is intended and what students actually learn.

What are the design principles that endure?

While curriculum development processes necessarily vary across different national contexts and over time, it is nonetheless possible to identify **a set of guiding principles for curriculum design that have cross-country relevance and also endure over time.**

The OECD E2030 curriculum analysis has shed light on twelve design principles (Figure 11). By applying these design principles, countries/jurisdictions could get closer to the goals and aims of the Learning Compass 2030. The twelve principles relate to four main categories: 1) design principles within a discipline; 2) design principles across disciplines; 3) design principles beyond school; and 4) design principles for processes.[9]

9. Some of the principles also play an important role as principles for implementation (e.g. engagement, student agency, teacher agency). Here, however, the focus is on curriculum design.

Figure 11. **Design principles**

Source: Adapted from OECD position paper, https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf.

A curriculum that is focused provides a framework for quality teaching with an emphasis on "less is more", enabling in-depth content learning for students.

Design principles within a discipline

1. FOCUS

Focus refers to the introduction of a relatively small number of topics in each grade in order to ensure depth and quality of students' learning. For example, many countries/jurisdictions foster focus in the curriculum by incorporating cross-curricular or interdisciplinary themes. Thus, instead of including additional courses or subjects, important themes and concepts are taught across the curriculum. For example, Norway's three themes of life skills, democracy and citizenship, and sustainable development foster and focus students' competencies in these core areas across subjects.

As new societal demands may seem to require additional subjects, the issues of focus may become more pertinent. A natural instinct might be to add more classes or material, which could result in a curriculum that is broad but shallow, "a mile wide and an inch deep". Encouraging focus while avoiding a crowded curriculum can be done during a curriculum revision. This was the case in Korea's 2015 curriculum reform, when content area experts were used to minimise unintended duplication across grades, encouraging focus while also creating space for additional content if needed.

A curriculum that is focused provides a framework for quality teaching with an emphasis on "less is more", enabling in-depth content learning for students. It clearly identifies fundamental knowledge, skills, values and attitudes to be acquired in a learning area and ensures that these are pitched at developmentally appropriate levels. It also can reduce cognitive overload and promote well-being among students, potentially leading to more in-depth learning and retention.

Focus is especially relevant for the issue of curriculum overload, as it is one of the most straightforward design principles to ensure content reduction. By clearly and concisely specifying the key concepts to be acquired, focused curricula allow teachers, students and other relevant stakeholders to have a clear understanding of what students are learning and why. This, in turn, increases the sense of relevance of the curriculum and contributes to more stakeholder buy-in, especially when it comes to reducing curriculum content.

2. RIGOUR

A rigorous curriculum should include topics that are challenging and enable deep thinking and reflection. Regardless of historical presence, influential voices, tradition and bias, curriculum content should be justified for the evidence-based contribution it makes to the development of students, ensuring high and relevant standards, with appropriate breadth and depth of topics. A rigorous curriculum incorporates content that develops and strengthens students' capacity to utilise knowledge and to apply skills in new and different contexts.

Rigour is particularly important when it comes to minimising curriculum overload and ensuring equity. Japan, for example, reduced curriculum content and decreased the amount of instruction time in its 1998 reform, in order to ease anxiety among students and parents about intensified competition for university entrance. Although the goal was to let no students fall behind and to enhance the quality of learning time, the reform was misunderstood as a lowering of standards. In response to a backlash to the 1998 reform, the 2008 curriculum increased both content and instruction time.

For this reason, rigour is a crucial design principle, helping to counter resistance and reassure stakeholders of the continuing depth of curriculum standards without lowering the quality of education.

3. COHERENCE

Coherence in the context of curriculum design refers to the extent to which there is a meaningful sequential structure of topics that reflect the logic of the academic discipline/disciplines on which they draw, from which the relationships between the different elements of curriculum become clear.

A coherent curriculum enables progression from basic to more advanced concepts, is pitched at developmentally appropriate levels (grade and age), and supports teachers to respond to learners' needs where student learning progress is framed by broader purposes. Research in neuroscience highlights the value of staging new content so that the brain can appropriately organise information for deeper understanding (Simon and Tzur, 2004[21]; Simon et al., 2010[22]; Lehrer and Schauble, 2015[23]; Penuel and Shepard, 2016[24]; Shepard, Penuel and Pellegrino, 2018[25]).

When introducing new content in a curriculum, prominent attention should be given to staging or sequencing the new topics, taking into account students' stress (e.g. feeling overwhelmed by too many materials that are too difficult for them) or boredom (e.g. repeating materials they already understand). Coherence also supports teachers in linking content so that different curriculum aspects can be fully exploited, as well as facilitating interdisciplinary teaching and learning to enhance student learning aligned to broader learning goals and objectives.

Students learn effectively when curriculum recognises their prior knowledge, skills, and learning progressions. This recognition is reflected in a "spiral curriculum", adopted by countries including Estonia and Ireland, which allows curriculum space for students to progress through their learning by stages rather than in a rigid, linear progression through each grade. Such an approach allows for more coherence of curriculum content across grades and reduces the risk of unnecessary duplication. It also gives teachers and schools flexibility to adjust content to their students' learning progression, with teachers reviewing content in a meaningful way to deepen students' learning. This approach guards against shallow learning over a broad range of topics.

Coherence is particularly important in light of curriculum overload, in order to keep a disciplinary logic within the curriculum while preventing unintended overlap and duplication of subject topics. It can also support articulation of how certain topics can be related across different disciplines, suggesting possible ways to promote interdisciplinary learning, thus minimising overload.

Design principles across disciplines

4. TRANSFERABILITY

In curriculum design, transferability entails structuring curriculum to allow students to understand fundamental concepts or big ideas that underpin a particular discipline and see how they apply across different disciplines. A transferable curriculum should also recognise how students can develop skills, attitudes and values in particular disciplinary contexts, while also applying them across different disciplines and contexts.

British Columbia (Canada) applied this principle in a recent curriculum redesign, by structuring curriculum around a number of what they call "big ideas" for each grade. For example, one of the big ideas in Grade 8 is: "Number represents, describes, and compares the quantities of ratios, rates, and percents". One of the big ideas in Grade 9 is: "Emerging ideas and ideologies profoundly influence societies and events". Big ideas are designed to generalise key concepts into broader knowledge and know-how and are applied across curriculum subjects. British Columbia also includes core values in the curriculum, such as respect for others, respect for diversity and positive interpersonal relationships, through mandated learning standards. Transferability is of critical importance for minimising overload by focusing on big ideas/fundamental concepts

and for embedding values into curriculum. As a principle in curriculum design, it operates at two levels. At one level, designing the embedding of values, skills and attitudes in the curriculum requires careful consideration of how each is best represented in content in and across different learning areas. This calls for detailed analysis of the purpose of each value in relation to students' cognitive, social, emotional and physical development, to determine the relevance and applicability of each within the learning area structure. At the other level, the transferability of values relates to how students are to demonstrate the resultant behaviours, attitudes and dispositions both in and outside the classroom.

5. INTERDISCIPLINARITY

A curriculum that favours interdisciplinarity and interrelatedness should provide students with opportunities to discover how a topic or concept can link and connect to other topics or concepts within and across disciplines and further into their life outside of school.

Such an approach is apparent in Japan's National Curriculum Standards (2017), which attempt to address social issues through a concept called curriculum management. The National Curriculum Standards not only support an interdisciplinary approach within relevant subjects, but also secure time in the curriculum for interdisciplinary learning, through a dedicated subject called "Period for Inquiry-Based Cross-Disciplinary Study", which provides students with opportunities to connect content across subject areas.

When the curriculum is recognised as being nested within an ecosystem in which broader student learning takes place (Figure 5) assessment of learning is seen as a collaborative undertaking involving teachers, parents and key stakeholders, as students' responses, behaviours and actions reflect not only what they are learning in the curriculum, but also the values modelled for them by others.

This principle is relevant for minimising curriculum overload and especially for embedding values in curriculum. Embedding values requires an appreciation of the ecosystem and interrelatedness in which the curriculum is nested and in which teaching and learning take place. It also means recognising how the values to be acquired by students through curriculum are supported through the actions and behaviours of others in and outside of school.

6. CHOICE

A curriculum built in line with the principle of choice should offer a wide range of topics, project options and opportunities for students to suggest their own topics and projects of interest, with support to help them make well-informed choices, especially for disadvantaged students.

Such a curriculum allows for flexibility in terms of opening up subject areas to new topics, new resources, innovative and alternative approaches to planning, teaching and assessing, and enabling teachers to engage their students in meaningful and relevant learning experiences.

An example of this principle in action is in the curriculum of New Zealand. In New Zealand, there are no compulsory courses for senior secondary school students. Instead, students can choose to take five to six subjects at three levels of depth from among 17 disciplinary fields and gain qualification units in these fields. Schools often set up the units that make up each course, but a growing number of schools are offering students the possibility to personalise their courses by choosing the unit of learning and assessment.

Choice is especially relevant in the context of effective curriculum and curriculum flexibility and autonomy, allowing students to make well-informed and guided choices when being granted student agency.

Design principles beyond school

7. AUTHENTICITY

An authentic curriculum should provide space and links to the real world where appropriate. It is a measure of quality of the extent to which the content is current, relevant and applicable to contemporary times. Therefore, it requires interdisciplinary and collaborative experiences outside school, alongside a mastery of discipline-based knowledge in school.

When curriculum content is authentic, it engages students in learning experiences that involve exploration of real and relevant issues that speak to them, their environment and their needs. Such a curriculum explores how subject matter relates to

students' future lives and work options, as well as enabling them to access topics and undertake project tasks that have a clear purpose, thus equipping them for further lifelong learning.

As an example of this principle in practice, the Curriculum for Excellence in Scotland (United Kingdom) set out to ensure that the curriculum framework better supported the needs of learners and the future workforce. To complement and support this aim, Scotland pursued reforms such as Developing the Young Workforce and Learner Journey, which are intended to provide a wider variety of learning experiences, more diverse pathways and options for learners, and better links between employers, higher education and schools.

This design principle is of crucial importance for minimising time lag, but also for addressing equity issues, adapting the curriculum and staying relevant to the needs of different students and society.

8. FLEXIBILITY

A flexible curriculum grants schools and teachers the possibility to update, adapt and align the curriculum to reflect evolving societal issues, as well as individual learning needs.

Such a curriculum is dynamic and responsive to different and changing circumstances and allows for the incorporation of new content and priorities. This helps the curriculum to be currently relevant and future-focused at the same time. A flexible curriculum also allows teachers to make decisions on when to spend more or less time on subject areas, adding more or less context when needed, in line with local priorities and individual student needs.

Flexibility has been a guiding principle for the 2020 curriculum reform in Wales (United Kingdom). The key strategy of the reform is to provide guidance rather than specification, to enable greater flexibility for teachers and schools. Curricular content is not specified in legislation. Instead, the Curriculum for Wales guidance (2020) contains: 1) the proposed curriculum requirements set out in legislation for all learners, to ensure that all schools cover some core learning; 2) guidelines for schools in developing their curricula across all areas of learning and experience; and 3) expectations around assessment arrangements to support learner progression. The intention is that this will allow greater flexibility in adapting the curriculum over time and, in light of evidence about its implementation, making it more sustainable. The new curriculum will be used throughout Wales from 2022.

This principle is, therefore, of critical importance to prevent time lag in implementation of the curriculum, as well as to ensure equity through innovative and flexible approaches to curriculum design, via tools such as personalised or digitalised curricula.

9. ALIGNMENT

When thinking about the principle of alignment, there are various dimensions within and across curriculum to take into account. First, pedagogies, and assessment practices should be well aligned with the curriculum. Second, initial teacher education and professional development should be aligned with the curriculum. Third, in order to ensure continuity of lifelong learning, it is crucial to ensure alignment and conceptual coherence between curricula across different levels of education. While the technologies to assess many of the desired outcomes may not yet exist, new teaching and assessment methods should be developed that value holistic student outcomes, including both learning and well-being.

This design principle had a strong influence on Ireland's 2015 reform of the Junior Cycle (lower secondary education), where a strong emphasis was placed on maximising alignment between the curriculum and assessments. A dual approach to assessment was developed, involving classroom-based assessment across

the three years of lower secondary education and a final, externally-assessed, state-certified examination. This approach was designed to enable an appropriate balance between preparing students for examinations and facilitating creative thinking, engaged learning and better outcomes for students. It recognises and values the different types of learning that take place in schools and allows for a more rounded assessment of the educational achievements of each young person.

This is especially relevant when considering effective curriculum implementation, with alignment affecting the various levels of curriculum (Figure 5). When there is alignment through policy intentions, curriculum and assessment, it is possible to minimise or even eliminate potential disconnections between the intended curriculum, experienced curriculum, assessed curriculum and achieved curriculum.

Design principles for processes

10. ENGAGEMENT

Strong engagement from teachers, students and other relevant stakeholders is of critical importance in the development phase of the curriculum, to ensure their ownership and buy-in during the implementation phase.

Engagement is essential if students are to fully immerse themselves in learning experiences, develop positive attitudes towards learning and better understand themselves as learners. It is also crucial in order to receive buy-in from stakeholders and avoid time lag at the recognition, decision-making and implementation phases, as well as to make teachers feel at ease with the changes by engaging them from the onset of the reform process.

The principle of engagement is central to curriculum reform in Ontario (Canada). In the province, the process of curriculum development is considered just as important as the outcome, as it renders the involvement and ownership of different stakeholders visible and makes it possible to develop relationships with them. The core understanding is that: "Curriculum cannot be written from one perspective without participation of all across the province." In its highly consultative curriculum redesign process, Ontario involves a wide variety of stakeholders, including school boards, educators, researchers, editors and others. Based on the inputs collected, content editors prepare and revise drafts of curriculum documents and courses that are co-developed through the stakeholder groups in iterations. This allows for innovative ideas coming out of the consultations to be integrated in real time.

Effective stakeholder engagement is especially important when aiming to minimise time lag, but it also has implications for: 1) curriculum overload (e.g. when reduction of content faces resistance); 2) flexibility and autonomy (e.g. when teachers feel unprepared for the autonomy they are granted); 3) equity and embedding values (e.g. when values to be embedded are not representative of the values shared by the country/jurisdiction); and 4) designing curriculum for effective implementation (e.g. in general, when there is no readiness in the country/jurisdiction to embark in effective and efficient discussions).

11. STUDENT AGENCY

A curriculum that grants students agency offers them a carefully designed space to participate in the curriculum design and implementation processes to ensure the relevance of the curriculum for learners. By motivating students and building on their prior knowledge, skills, attitudes and values, such a curriculum ensures that they feel a sense of ownership of their own learning. When students are empowered and granted agency, they are able to influence and determine what, when and how they are learning, meaningfully equipping them for their future.

This principle has guided the ongoing curriculum renewal in Hong Kong (China). Since 2014, self-directed learning has been promoted so that students assume more responsibility for their own learning and develop a more agentive approach to learning.

The principle of student agency is especially relevant to ensuring effective implementation and contributing to equity, but also to embedding values in curricula. A curriculum granting agency incorporates learning experiences that engage students in promoting values that are of personal interest and have relevance for them in relation to their goals and aspirations. Such curricula are also self-tailored to the specific needs of the individual and support students to become increasingly self-directed over time, allowing them to gain confidence in their ability to complete learning tasks, self-evaluate and build the skills they need to monitor, review and reflect on their progress.

12. TEACHER AGENCY

Teacher agency refers to empowerment granted to teachers to use their professional knowledge, skills and expertise to co-design and deliver the curriculum effectively.

Granting teacher agency in the development and delivery of curricula has emerged as an important design principle in relation to the issues of overload, flexibility and autonomy, as well as effective implementation.

Agency not only empowers teachers but also engages them early in the reform process, contributing to their buy-in and ease of handling redesigned curricula in the implementation phase. Striking the right balance between too detailed guidance (thus decreasing teachers' motivation to engage) and too shallow guidance (thus making teachers feel overloaded with responsibility), a curriculum designed with the principle of granting teacher agency enables teachers to tailor teaching and learning. This is done according to the needs and interests of their students and supports them in making important decisions regarding the overall management of curriculum, drawing on local resources, contexts and issues and their knowledge of what works best.

In Estonia, teacher involvement in the redesign of the new curriculum at the system level has been critical to ensure teachers' understanding and ownership of the new curriculum. As part of the country's reform, teachers must have an opportunity to participate in the creation of the school curricula. The country emphasises teachers' autonomy not only in the learning-teaching process, but also with respect to their own views on the curriculum and their motivation. The belief is that if teachers do not perceive themselves as agents of change, they may continue to teach content that has been replaced or is no longer relevant. Thus, teachers are expected to act in ways that respond to what their particular situation requires.

Engagement is essential if students are to fully immerse themselves in learning experiences ...

Reader's Guide

The Curriculum (Re)Design series by the OECD Education 2030 project is presented as a series of six thematic reports, each detailing a curriculum issue identified as a priority across a range of countries and jurisdictions.

The six thematic reports are:

- **What Students Learn Matters:** Towards a 21st Century Curriculum (OECD, 2020[26])
- **Curriculum Overload:** A Way Forward (OECD, 2020[15])
- **Equity through Curriculum Innovations** (OECD, forthcoming – title to be confirmed)
- **Curriculum Flexibility and Autonomy** (OECD, forthcoming – title to be confirmed)
- **Values Embedded in the Curriculum** (OECD, forthcoming – title to be confirmed)
- **Ecosystem Approach to Curriculum Redesign and Implementation** (OECD, forthcoming – title to be confirmed).

Each report is structured in line with **four questions** (translated into four chapters) that policy makers commonly face when addressing each of these six issues:

1. What does research say?

This chapter synthesises the key research evidence on the curriculum issue in question, summarising what is already known about the topic and identifying what is still unknown. The chapter also provides definitions of key concepts from the literature, describes research findings on the potential implications of not adequately addressing the issue, and highlights practices for addressing the curriculum issue that appear promising and are supported by evidence.

2. How do countries compare?

This chapter draws on multiple data sources to explore how countries compare in relation to the curriculum issue in question. The comparisons are based on data collected through the Education 2030 Policy Questionnaire on Curriculum (PQC) and Curriculum Content Mapping (CCM) exercise. The chapter also draws on other relevant OECD data, primarily from the Programme of International Student Assessment (PISA), the Teaching and Learning International Survey (TALIS) and Education at a Glance (EAG).

3. What are the challenges that different countries experience and what strategies do they use to address these?

This chapter describes common challenges experienced by countries with respect to the curriculum issue in question and the strategies adopted to mitigate these challenges. The chapter draws on qualitative data from the PQC as well as from the research literature. Illustrative examples of country challenges and strategies are presented throughout.

4. What are the lessons learned from unintended consequences?

While the strategies adopted by countries or identified as promising by research may be helpful in dealing with a given curriculum issue, they may also have unintended consequences. Some countries have reported experiencing outcomes that were not anticipated when using these strategies. This chapter articulates key lessons learned from countries' experiences so that others can learn from them.

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Curriculum is a powerful lever for changing student performance and well-being, and for preparing students to thrive in and shape the future. Amid growing global debate on globalisation and migration, climate change and technological advancements, countries are revisiting questions on the kinds of competencies students need for the future and how these can best be fostered through curriculum.

To help countries respond to these questions, the OECD Education 2030 project has undertaken an international curriculum analysis. The series of thematic reports arising from this analysis correspond to six main issues facing policy makers and curriculum designers: managing time lag between today's curriculum and future needs, addressing curriculum overload, ensuring equity through curriculum innovations, realising curriculum flexibility and autonomy, embedding values in the curriculum, and adopting an ecosystem approach to curriculum redesign and implementation.

This short volume serves as an overview to this series of thematic reports, providing contextual information on the curriculum frameworks of participating countries and jurisdictions, outlining the conceptual and analytical frameworks adopted, presenting a series of design principles that could support the development of future-oriented curricula, and concluding with a reader's guide for the report series.

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For more information:

education2030@oecd.org

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