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Building a world-class learning system

GEOFF MASTERS



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Author's acknowledgements

This paper draws on the findings of a joint study conducted by the National Center on Education and the Economy (NCEE) and the Australian Council for Educational Research (ACER). The study was codirected by NCEE's Director of Policy Analysis and Development, Jackie Kraemer, and ACER's CEO, Geoff Masters. The study also benefited greatly from case studies authored by researchers in the participating jurisdictions: British Columbia, Estonia, Finland, Hong Kong and South Korea. The contributions of all who participated in the study are gratefully acknowledged. Findings from the NCEE-ACER learning system study will be published in *Building a World-Class Learning System* (forthcoming).



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Introduction

Nations around the world recognise the urgency of transforming school education. This urgency stems from a mismatch between aspects of schooling and the broader societal, economic and work contexts in which schools now operate.

Many countries have evolved over the past half century from economies based on agriculture or other primary industries, to industrial economies, to post-industrial economies. In most countries, rapid change continues. As economies have modernised, digitised, and become more knowledge-based and service-based, the competencies required of workforces have also changed. Earlier requirements for basic knowledge and

skills, and the reliable implementation of routines, have increasingly been replaced by requirements for deep knowledge, thinking, problem solving, the ability to innovate, high-level technological skills, and social and emotional intelligence. In today's workplaces, challenges are often multifaceted and ambiguous.

Changes in the nature and requirements of work, the growing impact of automation on routine and low-skill tasks, and more frequent transitions between jobs, have introduced a need for the regular updating of knowledge and skills. To meet this need, many countries are developing more flexible learning arrangements, including partnerships with non-traditional

providers, online learning platforms and alternative ways of structuring learning, such as micro-credentials. An objective is to relax constraints on when and where learning occurs, by conceptualising learning as transcending traditional institutional arrangements and being potentially ongoing and lifelong.

School education often functions as a sorting mechanism more appropriate to workforces of the past, and so leaves many students without the knowledge and competencies their futures will require.

At the same time, countries have recognised that modern economies can leave large sections of the workforce and population behind. Opportunities for low-skill and manual work have declined with increasing automation and, in some cases, as work has been outsourced to lower-wage economies. A new global challenge is to ensure that a much larger proportion of the population achieves the

levels of knowledge, skill and competence required for effective engagement in modern societies and workplaces. In today's knowledge-based economies, the levels once attained by a relatively small percentage of the population must now be attained by almost all.

These global developments have direct implications for the work of schools. First, there are implications for the kinds of learning that schools value and promote. Many curricula and testing processes prioritise the memorisation and reproduction of facts and routines over the development of deeper understandings, critical thinking, problem solving, and personal attributes and dispositions. Second, there are implications for how learning itself is conceptualised. Rather

than being viewed as ongoing individual growth and development that can occur anywhere at any time, learning at school continues to be constrained in place and time by classrooms, school years, semesters and school timetables. Third, there are implications for how schools ensure that **every** student learns successfully and achieves high standards. School education often functions as a sorting mechanism more appropriate to workforces of the past, and so leaves many students without the knowledge and competencies their futures will require.

It is in this context that the National Center on Education and the Economy (NCEE) and the Australian Council for Educational Research (ACER) undertook a joint study to understand how five jurisdictions are approaching school education and its transformation. The five jurisdictions – British Columbia, Estonia, Finland, Hong Kong and South Korea – have all performed unusually well in international achievement surveys, including the OECD's Programme for International Student Assessment (PISA), over the past two decades. The study explored aspects of the 'learning systems' these jurisdictions have established, including the school curriculum, assessment and credentialling processes, teacher preparation and professional learning, leadership development, and the creation of supportive learning ecosystems. The objective was to understand how these five learning systems have been developed over time, the forces that have shaped them, and how these jurisdictions are now redesigning their learning systems for the future.

Performing well on traditional metrics

The study of these five jurisdictions has provided insights into what may be required for any jurisdiction to perform well on measures of the kind currently used in international surveys. In PISA, core measures are based on students' abilities to apply knowledge and skills in reading, mathematics and science to situations resembling those that might be encountered in everyday life. Although these measures require more than the recall of facts and the implementation of routines, they are 'traditional' in the sense that they relate to subjects historically found in every country's curriculum.

The NCEE-ACER study found differences in the learning systems in these five jurisdictions, but also observed important common features.

The school curriculum in these jurisdictions is structured around traditional subjects (disciplines). It is centrally developed and makes explicit in differing degrees of detail what teachers are to teach and students are to learn. In the years prior to a jurisdiction's unusually high performance, the curriculum was usually relatively detailed and prescriptive. In most of these jurisdictions, the curriculum has been incorporated into commercial textbooks and workbooks through which students work methodically.

Regular classroom tests are used to establish how well students have learnt what they have been taught. These are typically conducted at the end of periods of instruction, such as topics or chapters of textbooks. There may also be major examinations of learning, usually at

the end of upper secondary school and sometimes upon completion of lower secondary school. These examinations establish the standards all students are expected to achieve by these transition points. Although practices vary, students are usually graded on how well they have mastered taught content and met expected standards.

Another feature of these systems is that teachers are very well prepared in the subjects they teach. Both primary and secondary teachers are expected to be subject experts and may undergo five or more years of preparation to teach. There may be a requirement that all teachers have a master's degree, and these degrees may include mandatory research into pedagogical practices. To provide the expected levels of preparation, teacher education has usually been located within the nation's leading research universities.

These jurisdictions are also unusually effective in meeting the needs of individual learners and in working to ensure that no student slips behind in their learning. Strategies include minimising the possible impact of socioeconomic disadvantage by ensuring that all learners have basic requirements, such as a daily hot meal, essential healthcare, textbooks and laptops – usually free of charge or heavily subsidised. Special programs are developed to promote the full inclusion and success of particular groups of students, such as immigrants and First Nations students. Also, systemic approaches are used to identify and support individuals who fall behind in their learning. These approaches include

the appointment of specially trained teachers, the withdrawal of students for small-group teaching, and out-of-hours teaching and tutoring.

Finally, in most of these jurisdictions, education is highly valued as a path to personal fulfilment and success.

Families are strongly committed to seeing students succeed, and students themselves may spend considerable time outside school hours on homework and other school-related activities. Teachers are highly respected and are sometimes seen as having played a crucial historical role in preserving national language and culture. In addition, there

is unusual community support from other organisations, such as parent associations, non-government organisations, community groups and the business community, which may view schools as essential to national growth and to the creation of the kind of society they wish to become.

It seems likely that any jurisdiction that could redesign its learning system to incorporate features such as these would see an improvement in the reading, mathematics and science measures used in PISA, and in the IEA (International Association for the Evaluation of Educational Achievement) Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS).

There is general recognition that arrangements that produced high performances in the past may not be adequate to the challenges these jurisdictions now face.

Two post-industrial challenges

Despite their relatively high performances on these traditional metrics, these five jurisdictions have all been working to redesign their school learning systems. Their efforts are focused on two main challenges, which are

1. to better prepare young people for future life and work, and
2. to ensure that every young person learns successfully, achieves high standards and leaves school well-prepared for their future.

There is general recognition that arrangements that produced high performances in the past may not be adequate to the challenges these jurisdictions now face.

All five jurisdictions have been actively considering how young people could be better prepared for the future, and all have identified a need for students to develop broader competencies and personal attributes. Some jurisdictions have created descriptions of the kind of society they wish to become and the kinds of people they wish schools to develop. For example, South Korea sees a need for future citizens who are independent, with a strong sense of self-identity; creative and able to reason and solve problems; cultured and able to understand others; and democratic and able to participate in and contribute to society.

These jurisdictions recognise that the world has changed and that the knowledge, skills and attributes young people will require to navigate the future are likely to be different from those required by previous generations. For example, it has become more important that students can make judgements about the quality of online information, distinguish facts from unsubstantiated claims, understand the role of science in society, value democratic institutions and processes, and understand and take action to protect the environment. Curriculum reforms in these jurisdictions often also include goals for developing students' attitudes, values and personal dispositions.

At the same time, changes in the world of work have led these jurisdictions to give more emphasis to students' abilities to transfer and apply knowledge to new and unseen contexts, to take initiative, be entrepreneurial, think creatively, think globally, solve problems, use new technologies and work collaboratively with others as part of a team – outcomes that generally had lower priorities in earlier school curricula.

Curriculum reforms in these jurisdictions often also include goals for developing students' attitudes, values and personal dispositions.

In identifying competencies and attributes for the future, these jurisdictions have been influenced by conceptualisations of '21st-century skills', 'transversal skills' or 'general competencies', by the OECD, UNESCO and the European Union. Each jurisdiction has

identified between six and nine general competencies that all students are expected to develop through their learning of subjects, as well as through extra-curricular activities. These competencies are of four general types:

1. basic skills, such as literacy, numeracy, ICT/digital skills, communication skills and entrepreneurial skills

2. thinking skills, such as analysing, critiquing, questioning, investigating and generating and developing ideas,
3. personal skills, such as self-management, accepting responsibility and maintaining personal wellbeing, and,
4. social skills, such as community participation, cultural competence, and a commitment to peaceful coexistence and sustainable living.

The second challenge being addressed by these jurisdictions is to ensure that no student is left behind in their learning, and that **every** student learns successfully and achieves high standards.

This is not the case currently. Although these jurisdictions are more effective than most in minimising the number of students who perform at very low levels, there continues to be a significant percentage of 15-year-olds (typically between 10 and 15 percent) who perform below the OECD's minimally acceptable standard in reading, mathematics and science, and another 20 percent who achieve only this minimum. Students' levels of attainment vary significantly, with the most advanced 10 percent of 15-year-olds being at least four to five years ahead of the least advanced 10 percent of students. Although these jurisdictions are sometimes described as 'high equity', this is true only in a relative sense; in absolute terms, there continues to be a strong correlation in all five jurisdictions between students' performances and their socioeconomic backgrounds.

Marked variability in levels of attainment and gaps in performance for lower socioeconomic, rural/remote and First Nations groups persist, despite the exceptional efforts these jurisdictions have made to ensure equitable access and high outcomes for all students. Over recent decades, these jurisdictions have

made greater efforts than most to ensure that every student's basic needs are met and that all students are fully included and have equal educational opportunities; to address the particular needs of groups such as immigrant students, Indigenous students and students living in remote locations; and to identify and address the needs of students who struggle and fall behind in their learning. Yet, even in these jurisdictions, many students fail to achieve minimally acceptable standards and so are not fully prepared for their futures.

These jurisdictions are well aware of this challenge. They also recognise the likely personal and social consequences of low achievement. Students who fall behind in their learning at school often begin to

disengage. Some drop out entirely; and with increasing automation, there are declining employment opportunities for students who achieve only minimal levels of knowledge and skill at school. In the extreme, there are risks of disaffection, marginalisation, long-term poverty and even civil unrest.

These two challenges – to better prepare young people for future life and work; and to ensure that every young person learns successfully and achieves high standards – are faced not only in these five jurisdictions, but also by school systems throughout the world. They have led to growing international recognition of the need for significant educational reform.

Preparing young people for their futures

The five jurisdictions in the NCEE-ACER study have been addressing the first of these two challenges by reforming the school curriculum and its accompanying assessment processes. Most began reforms several decades ago and, in all five, reforms are continuing.

Curriculum reform

These jurisdictions have concluded that learners are best prepared for their futures by curricula structured around traditional school subjects that provide solid foundations in disciplines in the humanities, social sciences, natural sciences and mathematics. However, at various times, all have been concerned

about the amount of subject learning expected of students. Curricula have sometimes become voluminous as material has been added but little has been removed. (For example, the British Columbia curriculum of the 1980s was provided in more than 30 published documents, and the 2014 Finnish curriculum for elementary and middle school ran to 452 pages.) General concerns in these jurisdictions have been that large amounts of content can result in material being taught and learnt in less depth, may overemphasise passive, reproductive learning, and might leave little room for teachers to make professional judgements about what, when and how they teach.

A response has been to reduce the volume of content. At these times, curriculum documents and textbooks have become much slimmer. For example, efforts to reduce curriculum content in Estonia resulted in textbooks for some grades becoming half their length. In British Columbia, when teachers became overwhelmed by the amount of material in that province's curriculum ('integrated resource packages') in the 1990s, content was significantly reduced – the Grade 5 social studies curriculum that once consisted of 70 pages was summarised for teachers on a single page. Similarly, in Hong Kong, the 2002 Learning to Learn curriculum reduced the amount of rote learning required of students, and a 2020 task force recommended further trimming of that territory's curriculum to enable more in-depth learning.

There has also been an intention to promote deeper understanding by providing more opportunities in the curriculum for students to transfer and apply their subject knowledge.

In downsizing their curricula, most jurisdictions have not simply removed a percentage of existing content. Instead, curricula consisting of lists of precisely specified instructional objectives have been replaced by curricula constructed around a smaller number of more broadly defined student outcomes.

Sometimes these outcomes do not relate to particular grades, but are intended to be developed over several grades. In this way, attempts have been made to shift the balance of learning from many individual facts and procedures to deeper understandings of a smaller number of essential concepts and principles. British Columbia's current curriculum refers to these as 'big ideas'. It has been common in these jurisdictions to describe this change as focusing on depth rather than breadth of learning or, in the words of British Columbia's 2011 Education Plan, focusing on 'fewer but more important' learning outcomes.

There has also been an intention to promote deeper understanding by providing more opportunities in the curriculum for students to transfer and apply their subject knowledge. For example, from the early 2000s, a goal in Hong Kong was to place less emphasis on what students know, and more emphasis on what they can do with what they know. This was also a clear priority in Finland's 2014 curriculum. In the five jurisdictions, this shift in emphasis is sometimes described as a shift from knowledge to 'competence'.

However, questions remain in these jurisdictions about the appropriate balance between the acquisition of factual and procedural knowledge, and the development of deeper conceptual understandings and students' abilities to apply those understandings. Within these jurisdictions, some are concerned that students will be disadvantaged in examinations and in their further learning if they do not build a comprehensive factual knowledge base. There are also concerns that, while teachers may appreciate the flexibility that broadly stated outcomes provide, these can be open to interpretation, and are therefore less helpful in guiding teaching. In addition, shifts to prioritise deep learning and its application require time for such activities and assume high levels of teacher knowledge.

As well as promoting deeper disciplinary learning, these five school systems have been redesigning their curricula to place greater emphasis on general competencies and personal attributes. In response to changes in society, the economy and workplaces, this has included giving higher priority to outcomes such as innovation, collaborative problem solving, digital literacy, intercultural understanding and entrepreneurship.

Curricula have been redesigned to give more emphasis to skills in critical thinking, creative thinking, working in teams, using technologies and communicating with others. The five jurisdictions recognise that skills of these kinds require active rather than passive learning, and have encouraged more ‘experiential’ learning inside and outside schools, more use of ‘real-life’ problems and projects as contexts for learning and development, and more opportunities for students to create and discover. For example, British Columbia’s current curriculum promotes the use of ‘inquiry-based learning, project-based learning and problem-based learning’.

General questions remain about the best ways to incorporate broader curriculum intentions into existing discipline-based curricula.

These jurisdictions have also encouraged more cross-disciplinary learning, for example through students’ applications of knowledge from different disciplines to complex problems and investigative activities. Interdisciplinary teaching was proposed in British Columbia in 1988. Current curricula

in South Korea and Hong Kong call for stronger linking of learning across subjects; and Finland’s National Core Curriculum requires students to undertake at least one multidisciplinary project each year up to Grade 9.

In addition, curriculum reforms in these jurisdictions have given greater priority to the development of personal and social skills, and to ensuring students’ social and emotional wellbeing. The ability to self-manage or self-regulate is a priority in all five jurisdictions. Finland lists as one of its seven transversal competences ‘taking care of oneself and managing daily life’. All five curricula are designed to develop social skills, including cultural competence, social responsibility, community participation, caring for the environment,

solving problems in peaceful ways, valuing diversity and building relationships.

Although there is broad agreement across these jurisdictions on the desirability of broader curriculum priorities, there is much less agreement on the best ways to achieve these.

There are particular challenges in creating time within existing discipline-focused curricula for these broader curriculum goals. South Korea addressed this issue in 2016 by creating a ‘free semester’ for middle school students, during which students do not prepare for examinations but instead are able to ‘discover their dreams and talents’ by designing their own programs of study, engaging in hands-on activities and developing a broader range of competencies and attributes. Schools were able to offer this program for two semesters from 2018. In 2014, Finland introduced its multidisciplinary project as an opportunity for students to study ‘real-world phenomena in groups or teams’. Although some in Finland initially interpreted ‘phenomenon-based’ learning as an alternative way to organise learning in schools, the Finnish Agency for Education clarified that teaching, learning and assessing would continue to be based on subjects.

General questions remain about the best ways to incorporate broader curriculum intentions into existing discipline-based curricula. Are they best developed in dedicated time periods or through separate projects and extra-curricular activities, or – as most of these jurisdictions have concluded – by expecting teachers to ‘embed’ them within current subjects? For example, the British Columbia curriculum expects teachers to incorporate general competencies into every subject, but recognises that they may ‘manifest themselves uniquely in each subject’.

In addition, there are some concerns within these jurisdictions that recent curriculum reforms risk lowering standards and undermining past high performances. Most of these jurisdictions have seen declines in student performance in PISA over the past 20 years, and these declines are sometimes attributed to shifts in curriculum priorities and a reduced focus of disciplinary content. Parents and members of the community sometimes express concerns that curriculum changes have lowered standards. There are also questions about whether all teachers are equipped to develop general competencies and personal attributes, given that most – particularly secondary teachers – have been prepared to teach subjects.

Assessment reform

These jurisdictions have recognised that the reform of the school curriculum must be accompanied by parallel reforms of assessment, examination and credentialling processes. Without reform, assessment processes can undermine the intentions of redesigned curricula.

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Traditional assessments of student learning generally address subject knowledge and students' abilities to demonstrate what they have been taught, including their knowledge of facts, concepts, principles and abilities to implement subject-specific processes. However, the methods used to assess such

learning are much less appropriate for evaluating other forms of learning and development now being prioritised by these jurisdictions. Outcomes such as the ability to use technologies, think creatively, solve problems collaboratively, and communicate with others, are not

adequately assessed with traditional written tests. Also, the assessment of personal attributes and social skills such as resilience, self-management, intercultural understanding and effective relationship building are likely to require still other forms of observation.

At a deeper level, the purpose of assessment is becoming different. When assessments are designed to establish how well students have learnt what they have been taught, the question is whether they know and can demonstrate individual facts, concepts and processes. The more of these a student can demonstrate, the higher the grade they receive. However, the forms of learning and development now being incorporated into these jurisdictions' curricula do not lend themselves to present/absent conclusions. Competencies and attributes such as critical thinking, resilience, problem solving and intercultural understanding are better conceptualised as developmental. They are intended to be progressively developed across the years of school (and beyond). The assessment question is not whether they are present or absent, but the extent to which they have been developed, meaning that the role of assessment is to establish the points individuals have reached in their long-term, developmental progress.

In response, these five jurisdictions are making changes not only to what is assessed, but also to how assessments are made, and the fundamental purpose of assessing. These changes are generally being made in parallel with traditional forms of assessment.

The potential for assessment processes to undermine intended curriculum reforms is particularly evident when results are used for student selection. When competition is strong, as it is for entry into universities in South Korea, the content of school

examinations becomes a more powerful determinant of teacher and student effort than the broader intentions of the school curriculum. This observation has led British Columbia to abandon external end-of-school examinations entirely, and to rely instead on teachers' assessments of how well students perform on the intentions of the curriculum. Other jurisdictions have supplemented written examinations with other forms of assessment. For example, students in Estonia also complete a 'creative project' by the end of Grade 9, based on cross-curricular learning activities; and final-year students in Hong Kong are encouraged, but not required, to supplement examination results with a 'student learning profile' that summarises their achievements outside formal courses.

In recognition of the long-term, developmental nature of most competencies and attributes, some jurisdictions are encouraging assessment against frameworks or 'roadmaps' for student development.

As these jurisdictions have reformed assessment processes, they have faced questions similar to those relating to the curriculum: are general competencies and attributes better assessed as an integral part of subject learning or as stand-alone constructs? For example, is critical thinking better assessed as an essential part of science learning and proficiency, or as a stand-alone competency through a

separate 'critical thinking' test? Could both approaches be valid? Does this differ from construct to construct?

These jurisdictions also recognise that the perceived reliability of assessments determines their credibility and how much they are valued. If assessments of general competencies and attributes are perceived to be less reliable than assessments of subject knowledge, then they will be taken less seriously and have less influence on schools' priorities; but can creative thinking, resilience and teamwork be assessed reliably?

All five jurisdictions are addressing these questions, with differing levels of priority and varying approaches. Estonia has been working to broaden its assessments of student learning since 1996, when it required that 50 percent of upper secondary examinations assess students' abilities to analyse, synthesise and evaluate. More recently it has been developing 'competence-based' assessments for elementary and middle school students, designed to assess deep learning and students' abilities to apply knowledge. Finland has created a platform for teacher and student use in assessing and recording information about 'transversal' competencies. Hong Kong is promoting the assessment of a broader range of student learning by encouraging wider use of assessments based on field work, project reports and group discussions. Hong Kong also developed in 2003 an assessment program for affective and social outcomes, enabling schools to assess students on a number of subscales.

In recognition of the long-term, developmental nature of most competencies and attributes, some jurisdictions are encouraging assessment against frameworks or 'roadmaps' for student development. An example is British Columbia's construction of frameworks for evaluating and monitoring student progress in areas such as critical and reflective thinking, communicating, collaborating, creative thinking, personal awareness and responsibility, positive personal and cultural identity, and social awareness and responsibility. British Columbia's critical and reflective thinking framework consists of six described and illustrated levels of increasing proficiency. These six levels are 'not tied to specific grade levels and are reflective of lifelong development'. Currently, this framework is used only for student reflection and self-assessment.

Although these jurisdictions are working to reform assessment processes, they face significant challenges. These challenges arise from the fact that general competencies and personal attributes are fundamentally different from bodies of discrete subject knowledge and require methods of assessment very different

from familiar tests and examinations. They also face community concerns about the reliability and comparability of such assessments and concerns that the use of alternative methods, such as projects and portfolios of evidence, may further benefit students already advantaged by their access to superior resources.

Ensuring every young person learns successfully

These five jurisdictions have also been addressing the second of the two challenges identified in the NCEE-ACER study – to ensure that every young person learns successfully and achieves high standards.

As a general principle, these jurisdictions have pursued equity not by ensuring that all students are treated equally, but by better identifying and responding to individual learning needs.

Reforms here have included initiatives to ameliorate disadvantage arising from individuals' socioeconomic backgrounds, rural/remote locations, immigrant status and First Nations backgrounds. They have also included efforts to better identify and address the specific needs of individual learners, including through the better diagnosis of difficulties they experience and more

differentiated interventions and support. As a general principle, these jurisdictions have pursued equity not by ensuring that all students are treated equally, but by better identifying and responding to individual learning needs.

One element of these reforms in all five jurisdictions has been the introduction of more 'personalised' or 'student-centred' forms of teaching and learning.

The intention has been to move from mass delivery of the same curriculum to everybody (sometimes described as 'teacher-centric' delivery) to learning experiences and opportunities better tailored to the interests, progress and needs of individual learners. These reforms have included systemic efforts to

- better understand and respond to individuals' backgrounds and starting points
- give teachers more flexibility to decide on best next steps in individuals' learning and development
- provide intensive additional support to learners who require it, and
- provide more flexible pathways and student choice ('agency') in what and when they learn.

Most of these jurisdictions provide teachers and schools with resources they can use to identify and address individual learning needs. Resources include support in evaluating children's cognitive, social and emotional readiness for school. Estonia provides preschools with recommended approaches to assessing school readiness in a range of areas. It is also common to

provide schools with low-stakes tests to establish the points individuals have reached in their learning and to diagnose difficulties. These include Estonia's 'standard determining tests' in selected subjects and years of school; Hong Kong's online assessment item bank and territory-wide assessment system in Chinese, English and mathematics in Grades 3, 6 and 9; South Korea's Subject Learning Diagnostic Test to support students who are struggling academically; Finland's optional diagnostic tests in Finnish and mathematics; and British Columbia's 'performance standards', which describe four levels of student attainment in key aspects of reading, writing, numeracy, social responsibility and healthy living.

The efforts these jurisdictions make to support schools in monitoring individual learning and intervening to support learners who slip behind include the provision of targeted teaching resources, special teachers whose role is to work with these students, and systemic solutions that include small-group teaching and out-of-hours tutoring. These efforts appear to have significantly reduced the proportion of students performing at very low levels. On average across these five jurisdictions, only 13 percent of 15-year-olds perform below the OECD's minimum standard in reading, compared to 24 percent in all OECD countries.

Nevertheless, these five jurisdictions have had only limited success in ensuring that every student learns successfully and achieves high standards. By 15 years of age, a third of students in these jurisdictions have reading and mathematics levels at or below the level judged minimally acceptable by the OECD. Also, the highest-achieving 10 percent of students are typically four to five years of learning ahead of the lowest-achieving 10 percent. Given the exceptional efforts these

jurisdictions make to address individual learning needs, it might be asked whether they have reached the limit of what is possible to ensure that every young person learns successfully and achieves high standards. It is possible that they have – at least within the constraints of existing school structures.

The learning systems in these five jurisdictions, in common with learning systems everywhere, were designed to deliver mass education. This design is sometimes referred to as an 'industrial' model. Students are grouped (largely by age) and move through school together. All students are delivered the same grade-level curriculum, which they commence learning at the same time and are given the same amount of time to master. They are then graded on how much of this curriculum they can demonstrate and move in lockstep to the next curriculum (and usually teacher), where they make a 'fresh start' and the whole process is repeated. Underpinning this model is a fundamental intention to treat all students equally.

As a result, schools become highly effective sorting mechanisms. Over time, students are sorted into different destinations – academic or vocational learning and hence occupations (professional/leadership, managerial, trades, low-skill/manual). What makes schools such highly effective sorting mechanisms is their use of time. When all students are given the same amount of time to learn the same body of content and are then required to move in unison to the next curriculum, lower-achieving students often lack the prerequisites they require and fall further behind – sometimes, year after year. The low grades they receive on each year's curriculum confirm their status as poor learners, and many eventually disengage. In other words, the way that learning is

organised in schools makes it less likely that every student will learn successfully and achieve high standards.

In these jurisdictions it is possible to see the beginnings of an alternative way of thinking. Central to this alternative is a view of learning as a continuous, cumulative, and potentially life-long process that transcends institutional arrangements, fixed time periods, and locations. The Hong Kong curriculum promotes an understanding of learning as 'life-long' and 'life-wide' – it is ongoing and can occur anywhere at any time. In these jurisdictions, this aspect of learning became more obvious during COVID-19 school closures. When the focus is on learning as long-term progress, stages of schooling, fixed time periods, and the transitions between them, are recognised as artificial impositions on an ideally continuous process.

In these jurisdictions it is possible to see the beginnings of an alternative way of thinking. Central to this alternative is a view of learning as a continuous, cumulative, and potentially life-long process that transcends institutional arrangements, fixed time periods, and locations.

To promote greater continuity of learning, Estonia and Finland ensure that students have the same teacher for many, if not all, of their primary school years (to Grade 6). Some initiatives have also been taken to replace individual grades of school with wider grade bands, with the intention of better recognising student variability within these bands and targeting individual needs – for example, across the preschool and early school years, and through the upper secondary school.

There is also a strong belief in these jurisdictions that, while students may be at very different stages in their learning, every individual is capable of making good progress and eventually achieving high standards, if they can be provided with the necessary learning conditions. These conditions include learning opportunities in the form of 'stretch challenges' appropriate to their current levels of attainment.

This second challenge, of ensuring that every young person learns successfully and achieves high standards, may require deep change to school learning systems. Key to this change is likely to be a different approach to time. Instead of holding time constant and allowing students' levels of attainment to vary, expectations ('standards') will need to be held constant, and the time individuals require to achieve these standards allowed to vary.

The need for transformational change

The NCEE-ACER study investigated how these five jurisdictions have been reforming their learning systems to better prepare young people for their futures and to ensure that every young person learns successfully and achieves high standards. The study revealed how features of these jurisdictions' learning systems that have contributed to their unusually high performance over recent decades can also function as obstacles to the achievement of their current objectives.

There would be little place in transformed curricula for traditional dichotomies separating knowledge from skills, theory from practice, and academic learning from vocational learning.

The curriculum in these jurisdictions was designed originally for the transmission of disciplinary knowledge, particularly factual and procedural knowledge. Although knowledge transmission continues to be an essential purpose of schooling, traditional curriculum designs present challenges to the incorporation of newly prioritised forms of

learning, such as creative thinking, digital/IT skills, collaborative problem solving, entrepreneurial thinking, cross-cultural competence, interpersonal skills and the development of personal attributes and dispositions. In these jurisdictions, curriculum designs for knowledge transmission are proving less adequate for the thinking-and-doing curricula to which they are now committed. The consequence is that newly prioritised forms of learning are sometimes being addressed alongside and separately from disciplinary learning.

Transformational curriculum change is likely to involve the deeper integration of knowledge, skills and personal attributes

within disciplinary learning. There would be little place in transformed curricula for traditional dichotomies separating knowledge from skills, theory from practice, and academic learning from vocational learning. There would be less emphasis on passive, reproductive learning, and more emphasis on deep learning of disciplinary concepts, principles and methods, and of how these can be transferred and applied. Also, curricula would be more strongly designed around an understanding of learning as long-term, cumulative progress.

Assessment and credentialing processes in these jurisdictions were designed originally to establish and document how well students could demonstrate what they had been taught. Assessment designs were based on bodies of taught content. Tasks – often test and examination questions – provided coverage of this content, and the percentage of taught content a student could demonstrate determined their grade. In these jurisdictions, such designs are proving less adequate for assessing and monitoring the forms of learning now being prioritised.

Transformational change of assessment processes is likely to involve not only the use of a wider range of observation methods appropriate to newly prioritised learning outcomes, but also a fundamental change in the purpose of assessment – from quantifying how much students can reproduce and demonstrate, to establishing the points individuals have reached in their long-term development. This information would guide next steps in teaching and learning, and provide a basis for monitoring a learner's growth over

time. Also, reporting and credentialling would be designed to indicate the points individuals had reached and the progress they had made.

Finally, how school learning is organised can present obstacles to every student learning successfully and achieving high standards. The common requirement that all students progress through the school curriculum at the same pace has a practical sorting consequence, as students with only partial mastery of prerequisites are taught material increasingly beyond their reach. In these jurisdictions, time-based advancement through the curriculum

almost certainly contributes to some students falling behind and performing at or below minimally acceptable standards by age 15.

Transformational change of school learning is likely to involve loosening time constraints to give every student more time to master the content of a curriculum before being required to move to the next. This would be a radical change in the way most school learning is organised, but may be essential if **every** student is to make good ongoing progress and eventually achieve high standards.



GEOFF MASTERS

About the author

Geoff Masters is CEO of the Australian Council for Educational Research, a global organisation with offices in Australia, India, Indonesia, Malaysia, the United Arab Emirates and the United Kingdom. His work with governments and school systems has included the development of strategies for improving literacy and numeracy learning; a review of upper secondary assessment and university entrance procedures; a major review of the New South Wales school curriculum; the development of a School Improvement Tool; and the development of a Principal Performance Improvement Tool. For three decades he has written extensively on the reform of educational assessment processes, including in *Reforming Educational Assessment: Imperatives, Principles and Challenges* and as author and co-author of a range of assessment materials and professional resources, including the TORCH Tests of Reading Comprehension, the Developmental Assessment Resource for Teachers (DART) and the Assessment Resource Kit (ARK). His contributions to education have been recognised through the award of the Australian College of Educators' Medal and his appointment as an Officer of the Order of Australia.

About the paper

Geoff Masters explores the results of a joint study by the National Center on Education and the Economy (NCEE) and the Australian Council for Educational Research (ACER). The study sought to understand how five jurisdictions – British Columbia, Estonia, Finland, Hong Kong and South Korea, which have all performed unusually well in international achievement surveys over the past two decades – are approaching school education and its transformation. He describes key aspects of the learning systems these jurisdictions have established, comments on how they are now redesigning their learning systems for the future, and discusses insights into what may be required for any jurisdiction to perform well on measures of the kind currently used in international surveys.