



International Instructional Systems Study

Summary of Key Findings

Through a grant from the Center on International Education Benchmarking (CIEB), the Institute of Education (IOE) at the University of London undertook a comparative study of instructional systems across nine jurisdictions in six high-performing countries, as defined by rankings on the OECD's 2012 PISA assessments. That study produced country profiles and a cross case analysis. What follows is a summary of the study's findings.



**CENTER ON INTERNATIONAL
EDUCATION BENCHMARKING**
LEARNING FROM THE WORLD'S HIGH PERFORMING EDUCATION SYSTEMS



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Through a grant from the Center on International Education Benchmarking (CIEB), the Institute of Education (IOE) at the University of London undertook a comparative study of instructional systems across nine jurisdictions in six high-performing countries, as defined by rankings on the OECD's 2012 PISA assessments. That study produced country profiles and a cross case analysis. What follows is a summary of the study's findings.

The jurisdictions included in the study are:

- Australia (New South Wales and Queensland)
- Canada (Alberta and Ontario)
- China (Hong Kong and Shanghai)
- Finland
- Japan
- Singapore

In addition, the study looked at two jurisdictions (Massachusetts and Florida) within the United States for comparative purposes. Massachusetts was chosen as a high-performing jurisdiction and Florida was chosen as a moderate performer based on results from the U.S. National Assessment of Education Progress.

An instructional system was defined in this study as the standards, curriculum and associated assessments of a jurisdiction. The aim was to understand what, if anything, is in common among the high performers to see if there are aspects of instructional system design that might account, in part, for high performance. This is intended as a

preliminary study, relying on desk research, to provide CIEB with an overview of the data in order to identify areas for deeper inquiry.

The study focused on nine specific aspects of instructional systems:

- The goals or aims of the education system and how these are embodied in the curriculum
- How centralized or decentralized is management of the instructional system
- Principles and methods of accountability and their link to instructional systems
- What compulsory and optional subjects are included in the program of study in primary and secondary school levels
- To what degree curriculum is organized by discipline or integrated across disciplines
- Whether curriculum is common or differentiated
- How 21st century skills are embedded in the curriculum
- The clarity and content of curriculum for secondary vocational pathways
- How assessments are created and what stakes they have and for whom

IOE profiled each jurisdiction separately and produced a cross-jurisdictional report. The profiles of each jurisdiction and the cross-jurisdictional report can all be found [here](#).

Overall, the study found that all the high performing jurisdictions promote 21st century skills, have national

curriculum guidelines that allow for local interpretation but hold the standards constant, and all but one offer a comprehensive core curriculum for all students through lower secondary school. But overall instructional system patterns varied across the jurisdictions. The countries differed in the organization of instructional time and allocation of time to subject areas. Accountability systems are structured differently, with some relying on internal mechanisms and others building in results of national assessments. Differential grouping varies from early segmentation in Singapore's upper primary years to the more typical approach of differentiation in some subject areas in upper secondary grades. Some jurisdictions use high stakes testing at intervals throughout a student's career, and others only at the end of compulsory education. And the amount of assessment data that is shared publically varies.

The analysis also notes that many of the characteristics that these systems have in common were beyond the scope of the study and include: support for teachers throughout their careers and policies aimed at attracting the best and the brightest to the profession; a climate of high expectations in the home environment; and a focus on continually improving and upgrading their instructional systems based on gathering evidence.

The remainder of this summary highlights findings relating to each of the nine aspects of instructional systems that guided this study.

Key Study Findings

Goals of Education Systems

Across the nine jurisdictions, the goals of the education systems varied in detail but were all clear and explicitly stated. This suggests that the more explicit a system is about its underlying principles and objectives, the more coherent a curriculum based on those aims can be.

Most of the jurisdictions strive to combine philosophical aims of "education for education's sake" with more practical goals of succeeding in a globally competitive economy. Most emphasize literacy and numeracy, problem-solving, critical and creative thinking and citizenship.

Australia: New South Wales and Queensland set their educational goals in the context of a 21st century Australia being able to compete in the global economy on knowledge and innovation. Literacy and numeracy are emphasized, as is cross-disciplinary thinking.

Canada: Like Australia, Canada also focuses on building 21st century skills for their students as a way to compete in a global economy.

China: Hong Kong and Shanghai both suggest a break with the traditional rigid education of the past, describing a new vision of student-centered and competency-based systems.

Finland: Finland's goal is to create a democratic society, empowering individual students to create an egalitarian society.

Japan: Japan places a great value on education and skills, but also on group and social relations. There is a focus on

developing a capable citizenry and a sense of nationalism.

Singapore: Like Japan, Singapore emphasizes citizenship and responsibility to family, society and country.

The two U.S. states were notable for setting high aspirational goals without a clear connection to the curriculum standards.

Instructional System Management

The study analyzed the management of the instructional system (setting curriculum standards, content, and assessment) from the perspective of what was determined centrally and what was determined locally. This also includes ensuring that teaching materials align with standards and curriculum. The balance varies among these countries, but most follow a pattern of setting national curriculum guidelines and allowing for local or school interpretation and elaboration.

Australia: The country recently introduced a prescribed national curriculum and also cross state-assessments aligned to that curriculum. Previously, Australia's six states and two territories each had their own curricula and assessment. In 2008, Australia adopted the National Assessment Program – Literacy and Numeracy (NAPLAN) requiring all states and territories to use the same literacy and numeracy tests. Over the next few years, the Australia Curriculum, Assessment and Reporting Authority (ACARA) developed national curriculum in English, Math, Science, and History.

Canada: Each of the provinces, including Ontario and Alberta, has their own

provincial curricula and assessments linked to the state curricula.

China: China maintains a national curriculum. The province of Shanghai is a leader in curriculum reform efforts, often piloting new curriculum before it is rolled out to the rest of the country. While exams are still the primary driver and focus of student learning, there is a shift towards conceptual and more integrated learning, especially in Shanghai. It is still true that students who intend to go on to university must sit for a rigorous national university entrance examination at the end of upper secondary school.

Finland: The country has a core curriculum with room for local interpretation and school-based assessments until the end of high school when there is a national exam that is required for college entry.

Japan: Japan has a history of centrally determined education policy but is liberalizing this approach. Local schools can shape a local curriculum and teaching methods within the national curriculum frameworks.

Singapore: There is a national curriculum with course syllabi and assessments but teachers are given "white space" for them to adapt the syllabi to their local needs.

The United States has no national curricula. Massachusetts has curriculum frameworks, but Florida does not.

The study also looked at the degree of regulation in the process for choosing textbooks. Many countries had formal processes for approving textbooks. Canada, Hong Kong and Singapore allow schools to choose texts from an approved list whereas Japan develops

national texts for each subject. Finland and Australia are the two jurisdictions with a free market in textbooks and teacher materials. Schools in

Massachusetts choose their own texts, whereas in Florida texts must be state approved.

How Textbooks are Chosen

	Curriculum	Textbook Regulation
Australia-New South Wales	National	Open choice
Australia-Queensland	National	Open choice
Canada	Local	Choose from approved list
China-Hong Kong	Local	Choose from approved list
China-Shanghai	Local	Official textbooks plus other teaching materials selected by schools
Finland	Local	Open choice
Japan	National	Official textbooks
Singapore	National	Choose from approved list
Florida	Local	At least half need to be state approved
Massachusetts	Local	Open choice

Accountability

Governments want to both influence and reliably gauge how well individual students, teachers, localities, regions, and the nation itself are performing against education policy objectives. Many of the jurisdictions studied have developed assessment-based accountability policies in the belief that assessment outcomes are the fairest and most objective measure of national achievement. In some cases, assessment results can be “high stakes” in that they have consequences for schools, teachers, and/or students.

Some countries use national inspection systems to monitor school performance. Finland and Japan have no national inspection and instead rely on sample

based student assessment. Finland also uses self-assessment and municipal level inspection of schools. Hong Kong, Singapore and Shanghai have rigorous internal planning and monitoring and regular outside inspection. Australia and Canada have rigorous external testing (at the national level in Australia and the province level in Canada) with the intent of identifying schools in need of support. Singapore, Florida and Massachusetts have rigorous categorization of schools based on student test results. Florida has the highest stakes in that a low grade can result in the closing of a school. All of the Asian jurisdictions have a high-stakes high school graduation or college admission test that has stakes for students.

Accountability Systems

	External Evaluation / Inspection	Includes Test-Based Measures	Other Forms of Assessment	Consequences for Schools	Consequences for Teachers	Consequences for Students
Australia-New South Wales	Yes, administered by state, with alignment to national	Yes	No	No, except to identify those in need of support	No	No for NAPLAN tests in grades 3, 5, 7 and 9. Yes, for university admission
Australia-Queensland	Yes, administered by state, with alignment to national	Yes	State Schools Division conducts Teaching and Learning Audits in all state schools	No, except to identify those in need of support	No	No for NAPLAN tests in grades 3, 5, 7 and 9. Yes, for university admission
Canada	Yes, administered by province	Yes	Ontario's Education Quality Indicators incorporate student, teacher, and principal survey data	No, except to identify those in need of support	No	No
China-Hong Kong	Yes, national inspection	Yes	Self-evaluation by schools and inspection by the Education Bureau	Yes	No	Yes, for university admission
China-Shanghai	Yes, national inspection	Yes	School inspection by the Education Bureau	Yes	No	Yes, entrance tests for upper secondary school and university
Finland	No	No	Self-evaluation and sample-based student assessment by teachers	No	No	Yes, entrance test for university
Japan	No	No	Group accountability: teacher success tied to student success	No	No	Yes, entrance tests for upper secondary school and university
Singapore	Yes, national inspection	Yes	School Excellence Model incorporates self-evaluation on 9 quality criteria as well as an external inspection by the appraisal branch of the Ministry of Education	Yes	Yes, teacher evaluation results are based in part on student achievement as well as other measures. Performance ratings are used to determine bonuses and promotion decisions	Yes
Florida	No	Yes	No	Yes	Yes, teacher evaluation is based in part on student achievement	No
Massachusetts	No	Yes	No	Yes	Yes, teacher evaluation is based in part on student achievement	No

Programs of Study

Jurisdictions must determine how much time to devote to in-school instruction and which subjects are mandatory in which grades for primary and secondary school. Generally, there are regulatory requirements regarding hours of instruction overall as well as hours spent on particular subjects. This can be found in the curriculum frameworks in jurisdictions that have them. However, in some of the jurisdictions there is a certain amount of leeway for local authorities, schools, teachers, and students in the

organization of curriculum time or in subject choice.

The OECD has gathered data on compulsory instruction time and the number of days in the school year for some of the jurisdictions studied, as shown in the first table below.

There is a striking similarity in core subjects covered in 4th grade. Children in all jurisdictions studied language arts, mathematics, science, social studies, physical education/health and the arts in 4th grade. The second table below shows time spent on the core subjects.

Compulsory Instruction Time in General Education

	Average hours per year primary	Average hours per year lower secondary	Total hours lower secondary	Total hours lower secondary plus primary	Days in the school year
Australia	1,010	1,015	4,060	10,120	197
Canada	919	921	2,764	8,279	183
China	612	816	2,448	6,117	160
Finland	632	844	2,533	6,327	187
Japan	762	895	2,686	7,259	200
United States	967	1,011	3,033	8,835	180

(OECD, Education at a Glance, 2014)

Hours Spent Per Year On Key Subjects - Year 4 (P4)¹

	New South Wales	Queensland	Alberta	Hong Kong	Finland	Japan	Singapore
Language of instruction	50% to English & mathematics	240	240 (25%)	220	133	185	260
Mathematics		200	140 (15%)	160	114	130	220
Science		70	140 (15%)		64	80	80

¹ A number of assumptions have been made to create a common format for all jurisdictions. We have assumed that Finland has on average 38 weeks of school per year and lessons of 45 minutes, that Singapore has on average 40 weeks of school per year and Alberta has 950 hours of instruction per year.

Ontario does not provide guidance on time spent for each subject but requires Grades 1-8 to offer instruction in the arts, French as a second language (for English language schools), health and physical education, language, mathematics, science and technology and social studies.

In 8th grade, the core subjects remain and most jurisdictions add a language and about half add religious studies or ethics. In 10th grade, the core subjects remain in common (language arts, mathematics, sciences and social studies) but there is a bit more variation among the jurisdictions with a few requiring career education and most requiring technology.

A number of the jurisdictions organize curriculum across disciplines: Shanghai is organized into eight interdisciplinary learning areas; Hong Kong has also reorganized its curriculum around eight Key Learning Areas. Hong Kong, Singapore and Shanghai offer an integrated science curriculum and exams.

This study concludes that there is little apparent correlation of teaching hours with assessment results.

Cross-Disciplinary Curriculum

The jurisdictions varied in whether they tried to encourage cross-disciplinary integration within the curriculum. There is some belief that curriculum integration reinforces skill development and knowledge transfer and that it inspires students to take charge of their own learning. Others argue that it can detract from serious disciplinary learning and be a source of confusion for students. In general, there is a move in favor of further integration of curriculum and away from the classical

fixed boundaries of the traditional subjects.

Australia: One way Australia takes a cross-disciplinary approach is by specifying "general capabilities," such as ICT capability, critical and creative thinking, personal and social capability, and other 21st century skills as important skills to be developed across subjects within the national curriculum.

Queensland was a very early leader in developing integrated approaches but is moving away from that position in more recent years. In Queensland, career and technology skills are included in the lower secondary curriculum as separate subjects. There is also an interdisciplinary social studies curriculum called Studies of Society and the Environment that bridges history and science. In New South Wales, there are fewer cross-curricular themes and less embedding of 21st century critical skills.

Canada: Both Alberta and Ontario emphasize a foundation of literacy and numeracy integrated across the curriculum. Alberta has had an integrated curriculum policy for grades K through 3 since 2007, with explicit guidelines for multi-disciplinary and interdisciplinary teaching and learning. Alberta is moving away from a more prescriptive curriculum in grades K through 12 in order to encourage teachers to take a more cross-disciplinary approach. Ontario's curriculum documents identify opportunities for teachers to link related content and/or skills in two or more subjects within a single unit, lesson or activity.

China: China has focused on integration of subjects, particularly across science disciplines. Hong Kong's Integrated Science integrates chemistry, physics

and biology, providing students with a wider range of scientific ideas addressed in greater depth. The curriculum includes eight compulsory modules: 1) Water for living, 2) Balance within our body, 3) Science in a sprint, 4) Chemical patterns, 5) Electrical enlightenment, 6) Balance in nature, 7) Radiation and us, and 8) From genes to life. Similarly, Hong Kong's Integrated Humanities combines History, Chinese History, Economic and Public Affairs, and Geography. Since 1985, from grade 7 on, Shanghai has produced integrated examination papers that cross disciplinary boundaries in all subject areas that test students' capacity to apply their knowledge to real-life problems. Multiple-choice questions have disappeared from the city's public examinations.

Finland: Finland takes an integrated curriculum approach with the sciences. For example, environmental and natural sciences is an integrated subject group comprising the fields of biology, geography, physics, chemistry and health education.

Japan: Japan created a set period in secondary schools for interdisciplinary studies with a focus on experiential learning, although the time allocated to this has been reduced recently.

Singapore: The national curriculum is organized by core subjects, but some schools choose to use an integrated instructional approach. There are broad life skills such as citizenship, values education, and information technology integrated throughout the national curriculum.

Neither of the two U.S. states have a definitive policy on integrated studies, but both have adopted the Common Core State Standards that focus on

literacy across the natural and social sciences.

Common Curriculum

The jurisdictions generally have a common curriculum through lower secondary school, although in the United States, students are placed in ability groups, and therefore in the U.S. case, different courses, as early as elementary school. Singapore groups students by ability after taking exams at the end of Primary 4 that determine what subject combinations they will study in Primary 5 and 6.

In general, streaming or ability grouping occurs largely in upper secondary. In Japan, for example, students take a number of entrance exams to apply and be admitted to a senior high school. They are then placed into general, specialized or integrated curricular programs. General courses lead to university while specialized courses prepare students for vocational study. In Shanghai, students take the *zhongkao* to determine whether they attend an academic or a vocational school. Finland also streams students into general or vocational education but the student makes the choice. In Ontario, there are academic and vocational pathway choices offered within comprehensive high schools.

Australia: The Australian federal government and states have no explicit policies on setting or streaming (except for gifted and talented), delegating decisions to the school or classroom level.

Canada: Canada has no overall national policy on differentiation among students (and neither do the provinces of Ontario or Alberta). Administrators at the district or school level are allowed to

determine if gifted and talented students get special provision. Alberta supports differentiated learning within classrooms, using a system of stratified courses at the senior high school for almost every academic subject. It also has different types of diplomas and certificates that reflect different levels of learning and courses taken. Ontario takes a similar approach offering coursework differentiated by level in high school. Students take different courses depending on their postsecondary pathway interest (university, technical college, workplace).

China: China has a national curriculum. Hong Kong has moved away from the traditional practice of streaming students at the secondary level, promoting a standardized foundation of learning. Shanghai offers three types of secondary courses: a basic compulsory curriculum, an enriched curriculum of electives and an “inquiry based” curriculum which takes place outside of school and includes community service.

Finland: While Finland used to stream students into groups according to their ability in mathematics and in foreign languages, that is no longer the case today. Finland has a core value of inclusiveness and all students receive a similar basic education through age 16, even those with severe learning difficulties. Students who need extra help are provided with part-time special education in small groups led by specialist teachers.

Japan: Teachers teach based on a common national curriculum; Japan has clear policies encouraging classes to remain together and cover the same material. There is no differentiation into ability groups

Singapore: This is the only jurisdiction that separates students by ability (or streams) in primary school on the basis of an examination in Primary 4. There is some shifting toward differentiating students within subject areas rather than for a full program of study because while students can and do change pathways, most students’ future is mapped out at an early age. In lower secondary, students are streamed into Express, Normal (Academic) and Normal (Technical) courses, which lead to examinations that determine their entry into university or vocational / technical programs of study.

United States: While elementary students receive a common foundational curriculum, teachers regularly place students into ability groups in order to better target lessons to children’s individual needs. At the secondary level, there is a general goal of graduating all students ready for success in college and careers, however, schools tend to offer pathways of study that are oriented towards a student’s postsecondary interest (vocational or university). Students with an interest in going directly to university are more likely to enroll in more rigorous coursework, such as Advanced Placement courses or dual enrollment college classes, to increase their chances of being admitted to a more selective university. In Florida, for example, more than 50,000 high school students participate in dual enrollment, taking post-secondary coursework and earning credit towards an industry credential or associate’s degree.

21st Century Skills

The OECD defines 21st century skills as necessary for citizens to thrive in a globally competitive marketplace and be responsible and contributing members of society. These include creativity and innovation; critical thinking; communication; collaboration; information literacy; personal and social responsibility; and cultural awareness and competence. All the jurisdictions highlight the skills students need to thrive in a globally competitive marketplace and be responsible and contributing members of society. The report finds, however, that they differ in the degree of prescription in how they are taught and if they are explicitly assessed.

The study identified *Queensland, Finland and Singapore* as early adopters in promoting these skills, making changes in the early 1990s in order to promote innovation and a knowledge-based economy.

Australia: Queensland includes the 21st century skills of literacy, numeracy, ICT capability, critical and creative thinking, personal and social capability, intercultural understanding, and ethnical understanding into its curriculum. Known as general capabilities, these skills are addressed in the Australian Curriculum using icons within the content descriptions for English, math, science, history and geography to indicate opportunities to develop these skills. However, there is evidence that teachers could use additional guidance and examples of how to develop students' general capabilities and more could be done to make explicit the links between content and capabilities. New South Wales' curriculum is more traditional than the Queensland curriculum, with civics and

citizenship absent from its key learning areas, fewer cross-curricular themes and less embedding of 21st century critical skills.

Canada: Alberta includes 21st century competencies under the rubric of "competencies for engaged thinkers and ethical citizens with an entrepreneurial spirit" in its curriculum. Examples of ideal student performance and outcomes are provided. In Ontario, 21st century skills have been an important focus of reforms and are combined with government strategy for literacy and numeracy.

China: Recent reforms in Hong Kong emphasize 21st century skills and teachers are encouraged to change their pedagogy and focus on making their classrooms more interactive. Assessment has also been changed to be more open-ended and inquiry-based. There is a large investment in technology to "unleash the learning power" and strengthen the development of students' self-directed learning, creativity, collaboration, problem-solving, and computational thinking skills. Shanghai does not have an overarching framework for measuring 21st century skills, but uses PISA-type tests of problem-solving to shift teaching and focus on modern skills. A professional development program supports teacher learning of 21st century competencies.

Finland: Finland's definition of 21st century skills is unique in that it includes such themes as cultural identity and internationalism and responsibility for the environment. The Finnish National Board of Education expects teachers to incorporate broad cross-curricular themes such as active learning, technology and society, active citizenship and media skills into their

instruction, without prescribing exactly how they are to be taught.

Japan: Japan's 2008 rewrite of the national curriculum emphasizes the importance of students acquiring basic skills, nurturing thinking abilities, and self-expression. The country has implemented "integrated learning" across courses, without allocating hours for this as a course, but allowing teachers to design courses that promote critical thinking and communication skills. However, while these skills and ICT education are prioritized in national policy documents, it is not clear that they are being fully implemented across schools.

Singapore: Singapore's Ministry of Education introduced a greater focus on creative and critical thinking beginning with its 1997 reforms. The Singapore approach calls for the integration of thinking skills explicitly within core disciplines. Project-based and inquiry approaches were later added to help students make connections across disciplines. In math, the emphasis is on problem-solving and adaptive reasoning; in science and humanities, the focus is on the inquiry process.

Both U.S. states include 21st century skills in their goals statements, but do not have curriculum that integrates these skills. Both have adopted the Common Core State Standards, which include a focus on 21st century skills. In every grade level of the English language arts standards, there is a common standard calling for "collaborative discussions." The ELA standards also call for students to

communicate effectively and through a variety of media. Digital tools are mentioned as well as oral and written skills. In the math standards, there is an emphasis on problem-solving and critical thinking.

Vocational Pathways

All jurisdictions offer pathway choices for students in upper secondary, with a clear recognition of the need to provide a modern and relevant vocational route. Singapore and Finland have the highest percentage of students in vocational pathways. Vocational learning, with hands-on, applied elements is often seen as a way of keeping students engaged in school. Real world experiences widen students' perspectives and provide a foundation for future career success, encouraging the development of practical skills, such as decision-making, problem-solving, teamwork, and written and oral communication. In most of the jurisdictions studied, vocational education and training leads to both the workplace and higher education (although it may be most likely that a student enters a polytechnic/technical institution rather than a university).

In some systems at the upper secondary level there are general vocational courses and in some there are set vocational programs of study that are externally assessed. In almost every case, vocational learning is offered in tandem with core academic learning. In several jurisdictions vocational pathways are developed with business partners.

Vocational Pathways of Study

	Secondary Vocational Options	Vocational Certification Available
Australia-New South Wales	Vocational courses at colleges of technical and further education, senior colleges, or rural training schools	Record of Student Achievement plus vocational qualifications on the Australian Qualifications Framework
Australia-Queensland	Vocational courses at colleges of technical and further education, senior colleges, or rural training schools	Courses provide credit towards the Queensland Certificate of Education that details academic and vocational results of completed studies
Canada-Alberta	Vocational courses in comprehensive secondary schools	High School Diploma (or certificate of achievement) requires 3 vocational credits
Canada-Ontario	Applied course options in grades 9 and 10 with students selecting academic/vocational pathway in grades 11 and 12	Vocational credits can be used to meet the Ontario Secondary School Diploma requirements (with special notation of vocational credentials earned)
China-Hong Kong	Vocational programs during last three years (of six) of secondary school	Diploma in Vocational Education (instead of Diploma of Secondary Education)
China-Shanghai	Vocational upper secondary school coursework (2-4 years)	<i>Gaokao</i> (university entrance test) does not have specific vocational focus
Finland	Vocational upper secondary vocational schools (distinct from general upper secondary schools)	Vocational qualifications can be completed in addition to the Matriculation Examination (university entrance test)
Japan	Upper secondary schools with a focus on vocational and technical education (distinct from general upper secondary)	Certificate of Upper Secondary Education does not have a specific vocational focus
Singapore	Normal Technical curriculum is the most vocationally oriented pathway available in lower/upper secondary. The curriculum prepares students for a technical-vocational education at the Institute of Technical Education.	GCE N Levels; no special vocational certification
Florida	Vocational courses in secondary school	High school diploma; no special vocational certification
Massachusetts	Vocational courses in secondary school	High school diploma; no special vocational certification

Assessment

Jurisdictions vary in terms of how often students are assessed and whether assessments are high stakes or not. Some test frequently, some test with an emphasis on high stakes, and some use testing at key gateways (school leaving or university entrance, for example).

Assessment for learning—using the test to provide feedback to both the teacher and the students on the student’s

progress towards achieving the learning objective—is mentioned explicitly in most of the jurisdictions covered, with the exception of Japan and the U.S. states.

Finland is at one extreme with only one national exam at the end of high school, some sample testing before then and school-based testing (with clear stakes for students). Japan has mostly school-based tests until high school when it is high stakes for the students. Both

Shanghai and Singapore are characterized by intense, exam-driven assessment systems. Hong Kong shifted away from gateway exams at the end of lower secondary. Now students only sit for an exam at the end of upper

secondary that helps determine their entrance to university. Australia, Canada and United States have high stakes tests for schools but not students (although Canada requires students to pass a literacy exam to graduate).

Compulsory Testing

	Primary	Secondary	University Entrance
Australia- New South Wales	<ul style="list-style-type: none"> • Best Start Kindergarten one-on-one diagnostic assessment of literacy and numeracy skills • Yearly literacy and numeracy assessments, Grades 3 and 5 (NAPLAN). • Sample testing in science, civics and citizenship and information and communications technology (ICT), every three years in Grade 6 (NAP) 	<ul style="list-style-type: none"> • Yearly literacy and numeracy assessments, Grades 7 and 9 (NAPLAN) • Sample testing in civics and citizenship and information and communications technology (ICT), every three years in Grade 10 (NAP) • Essential Secondary Science Assessment, Year 8 <p>Higher School Certificate examinations for each subject worth 50% of students' grade</p>	<ul style="list-style-type: none"> • Australian Tertiary Admission Rank (ATAR) rank orders students nationally (except Queensland) based on weighted results of high school course outcomes
Australia- Queensland	<ul style="list-style-type: none"> • Yearly literacy and numeracy assessments, Grades 3 and 5 (NAPLAN) <p>Sample testing in science, civics and citizenship and information and communications technology (ICT), every three years in Grade 6 (NAP)</p>	<ul style="list-style-type: none"> • Yearly literacy and numeracy assessments, Grades 7 and 9 (NAPLAN) • Sample testing in civics and citizenship and information and communications technology (ICT), every three years in Grade 10 (NAP) <p>Externally moderated school-based assessment, Years 10-12</p>	<p>Queensland Core Skills test in year 12 containing multiple choice questions, short answers and a writing task used for scaling purposes</p>

	Primary	Secondary	University Entrance
Canada-Alberta	<p>Provincial Assessment Tests (PAT) in English language arts and mathematics (Grade 3) and English, mathematics, science, social studies and French (Grade 6) are being replaced by Student Learning Assessments (SLAs) “readiness” assessments. SLAs will be given at the beginning of the school year in Grades 3 and 6 to plan for learning. They are computer-based and interactive, concentrate on literacy and numeracy, and designed to assess problem solving, critical thinking and creativity</p>	<ul style="list-style-type: none"> Provincial Assessment Tests (PAT) in English, mathematics, science, social studies and French (Grade 9) are being replaced by Student Learning Assessments (SLAs) “readiness” assessments. SLAs will be given at the beginning of the school year in Grade 9 to plan for learning. They are computer-based and interactive, concentrate on literacy and numeracy, and designed to assess problem solving, critical thinking and creativity Students enrolled in Science 30, Biology 30, Chemistry 30, Physics 30, ELA 30-1 and 30-2, Français 30-1, French Language Arts 30-1, Mathematics 30-1 and 30-2, Social Studies 30-1 and 30-2 must take diploma examinations <p>Pan-Canadian Assessment Program (PCAP), national standardized tests of reading, math and science skills, given every three years in Grade 8</p>	
Canada-Ontario	<p>Assessments in reading, writing and mathematics, Grades 3 and 6</p>	<ul style="list-style-type: none"> Assessment of mathematics in Grade 9 Literacy assessment in order to graduate from high school <p>Pan-Canadian Assessment Program (PCAP), national standardized tests of reading, math and science skills, given every three years in Grade 8</p>	

	Primary	Secondary	University Entrance
China-Hong Kong	Territory-wide System Assessment (TSA), basic competency tests in Chinese language, English language and mathematics in Primary 3 and 6	<ul style="list-style-type: none"> Secondary schools can set entrance tests,(not all do) The Territory-wide System Assessment (TSA), basic competency tests in Chinese language, English language and mathematics in Secondary 3 Hong Kong Diploma of Secondary Education (HKDSE) examinations in Chinese, English, mathematics and liberal studies plus, typically, two or three other subjects in Secondary 6	<ul style="list-style-type: none"> Students who want to attend mainland universities take the <i>gaokao</i> (see Shanghai, below)
China-Shanghai	<ul style="list-style-type: none"> Examination at last year of primary Entrance examination for lower secondary	<ul style="list-style-type: none"> Graduation examinations for lower and upper secondary (<i>huikao</i>) subject based areas Entrance examination for senior high school (<i>zhongkao</i>) in Chinese, mathematics, English, sciences, social science	<ul style="list-style-type: none"> Entrance examination for university (<i>gaokao</i>). Chinese, mathematics and foreign language (usually English) are compulsory.. Students also select from three sciences and three humanities depending on their desired program of study and provincial requirements
Finland			<ul style="list-style-type: none"> Matriculation examination at end of upper secondary
Japan	Diagnostic exams in Japanese and mathematics, Grade 6	<ul style="list-style-type: none"> Diagnostic exams in Japanese and mathematics Grade 9 Entrance examination for upper secondary	<ul style="list-style-type: none"> National Achievement test in civics, geography and history, Japanese literature, foreign language, science and mathematics University admissions examinations

	Primary	Secondary	University Entrance
Singapore	Primary school leaving exams in English, mother tongue, mathematics and science	<ul style="list-style-type: none"> N or O level examinations at end of lower secondary in six to eight subjects <p>H1, H2 and H3 (A level) examinations at end of upper secondary usually in four subjects for academic track students</p>	<ul style="list-style-type: none"> A level examinations used for university entrance
Florida	<ul style="list-style-type: none"> Reading and mathematics tests every year between Grades 3 and 8 Science test once between Grades 3 and 5 and once between Grades 6 and 8 FCAT Science test in Grade 5 and Writing test in Grade 4 	<ul style="list-style-type: none"> Reading and mathematics in Grade 11 Science once between Grades 10 and 12 FCAT Science test in Grade 8 and Writing test in Grades 8 and 10 Florida End of Course Assessments (FLEOC) in Algebra I, Biology I, Geometry, US History, and Civics 	<ul style="list-style-type: none"> Required to pass FCAT Grade 10 reading in order to graduate high school ACT, SAT in reading, writing and mathematics Advanced Placement examinations
Massachusetts	<ul style="list-style-type: none"> Reading and mathematics tests every year between Grades 3 and 8 <p>Science test once between Grades 3 and 5 and once between Grades 6 and 8</p> <p>MCAS Science and Technology/Engineering test in Grades 5 and 8</p>	<ul style="list-style-type: none"> Reading and mathematics in Grade 11 Science once between Grades 10 and 12 	<ul style="list-style-type: none"> Required to earn a scaled score of at least 240 on Grade 10 ELA and mathematics; scaled score of at least 220 on one of biology, chemistry, physics or technology/engineering in order to graduate high school ACT, SAT in reading, writing and mathematics <p>Advanced Placement examinations</p>