

Dadansoddi ar gyfer Polisi



Analysis for Policy

Ymchwil gymdeithasol
Social research

Rhif/Number: 65/2013



Llywodraeth Cymru
Welsh Government

www.cymru.gov.uk

A Rapid Evidence Assessment on the Impact of Curriculum and Assessment Arrangements within High Performing Countries



Assessment Arrangements within High Performing Countries

NFER & Arad Research

Views expressed in this report are those of the researcher and not necessarily those of the Welsh Government

For further information please contact

David Roberts

Knowledge and Analytical Services

Welsh Government

Sarn Mynach

Llandudno Junction

LL31 9RZ

Tel: 0300 062 5485

Email: david.roberts@wales.gsi.gov.uk

Welsh Government Social Research, 2013

ISBN 978-1-4734-0311-6

© Crown Copyright

Table of contents

Glossary of acronyms	2
1 Introduction	8
2 Curriculum arrangements in high performing countries	10
3 Assessment arrangements in high performing countries	34
4 The evidence in the Welsh context	56
5 Discussion	66
6 Appendix 1 Methodology and approach.....	71
7 Appendix 2 Search strategy in detail.....	75
8 References	82

Glossary of acronyms and terminology

ACCAC	Awdurdod Cymwysterau Cwricwlwm ac Asesu Cymru / Qualifications, Curriculum and Assessment Authority for Wales
CIP	Community Involvement Programme, Singapore
CSAT	College Scholastic Ability Test, Korea
EQAO	Education Quality and Accountability Office, Ontario, Canada
FSA	Foundation Skills Assessment, British Columbia, Canada
INCA	International Review of Curriculum and Assessment Frameworks
L1, L2	First language/home language/mother tongue, second language or first learned foreign language
LNF	Literacy and Numeracy Framework, Wales
NAEA	National Assessment of Educational Achievement, Korea
NCEA	National Certificate of Educational Achievement, New Zealand
NFER	National Foundation for Educational Research, United Kingdom
NMSSA	National Monitoring Study of Student Achievement, New Zealand
OECD	Organisation for Economic Cooperation and Development
PAT	Provincial Achievement Test, Alberta, Canada
PCAP	Pan-Canadian Assessment Program
PIRLS	Progress in International Reading Literacy Study
PISA	The Programme for International Student Assessment, run by the Organisation for Economic Cooperation and Development
PSLE	Primary School Leaving Examination, Singapore
REA	Rapid Evidence Assessment
SEM	School Excellence Model, Singapore
TIMSS	Trends in International Mathematics and Science Study
21st century skills	skills relevant to modern society including critical thinking, collaboration, adaptability and social responsibility
action research	a method of research in which the researcher participates in the group or process being studied, collaborating with others in the group to investigate an issue or resolve a problem
constructed response item	a question for which the answer is composed by the learner
criterion-referenced test	a test intended to find a learner's level of ability on a subject (the criterion). This differs from norm-referenced tests, which seek to put the learner on a scale in relation to other learners.
digital literacy	the ability to use and evaluate digital technology in order to function in modern society
formative assessment	assessment activities that show teachers what pupils have already learned and help teachers decide what to teach next.

high performing country	in this report a country which has repeatedly out-performed other countries participating in standardised international educational assessments
high-stakes tests	tests which have a significant impact on the test taker (for example tests which determine pupils' secondary schools or university entrance)
matriculation	becoming eligible to enter university, commonly through the completion of examinations at the end of secondary education
moderated teacher judgements	the validation of teacher assessments by an external assessor who will make recommendations for necessary adjustments
multiple choice item national sample surveys	a question for which the answer is selected from a list surveys designed to provide a 'snapshot' of national performance in a chosen subject area by administering a test to a representative sample of students (as opposed to an entire cohort). These are often used to inform policy decisions at national or regional levels. They are less useful for school level decisions or to inform the teaching and learning of individuals or groups.
Skills Framework	Skills Framework for 3-19 year olds in Wales
standard deviation	in statistics the measure of the variability of the data
standardised test	a test that is created, administered, marked and interpreted in a standardised way to ensure comparability of scores across students
summative assessment	a type of assessment used at the end of a topic/ year to show what pupils have learned
te reo Māori	the Māori language

Summary

1. NFER conducted a rapid evidence assessment, designed to explore the impact of curriculum and assessment arrangements within five countries whose students achieve highly in international surveys. The study involved systematic searching and a best-evidence approach to the selection of literature and looked in particular at evidence relating to the education systems of Canada, Finland, Korea, New Zealand and Singapore.

Key Findings

2. A broad overview of the key findings is outlined below.

Curriculum

3. In the five high performing countries identified:
 - Each of the five countries addressed the same core areas of literacy/first language; mathematics/numeracy and basic science. The same is true in Wales.
 - All five countries included elements of arts, humanities (or social studies), technology and physical education. The same is true in Wales.
 - There was some (slight) variation in the extent to which foreign languages, civics and moral education were addressed.
 - The curricula of all five countries addressed key skills and competencies, including critical and creative thinking and problem solving. The same is true in Wales, although the skills framework is not statutory.
 - Digital literacy is embedded within the curriculum of each country, but is delivered across the curriculum and is not taught as a separate subject. The same is true in Wales.
 - Some countries include a significant focus on entrepreneurship.
 - The focus on basic skills and competencies is clearly set out within national strategies which outline the rationale and expectations. The same is true in Wales.

- Cross-curricular/interdisciplinary learning set in real life contexts and incorporating overarching themes is inherent in the curricula in the selected high performing countries.
- In general, the curricular requirements in each country were broadly described allowing a significant degree of school/teacher ownership of specific content.
- Each country maintained an outward orientation and undertook regular reviews, consulting a range of stakeholders. The same is true in Wales.

Assessment

4. In the five high performing countries examined:

- Participation in international surveys was commonly used to ascertain national performance standards.
- All countries used a balance of test and teacher assessment information to inform teaching and learning.
- Standardised tests were generally used to support and inform teacher assessment and to maintain a shared understanding of assessment standards and criteria.
- National external assessment occurred at the end of primary and secondary (compulsory) phases in all countries except Finland. Some countries, or provinces, used additional standardised tests for system, regional and school level monitoring.
- None of the five countries examined used annual cohort testing, as planned in Wales from 2013 onwards.

The Welsh dimension

- In terms of curriculum and assessment, the current system and immediate plans for Wales are well aligned with practice in high performing countries.
- Based on PISA data Wales is starting the journey forward from a lower level of average student performance than the high performing countries in this review.

The Welsh Government has recognised this position and the then Minister for Education and Skills, Leighton Andrews, made a priority of improving the educational outcomes and educational standards for learners in Wales viewing this as a means of improving the Welsh performance in PISA with a target that Wales be in 20 top performing countries in PISA on reading by 2015¹.

Making it happen

5. Reform and development of curriculum and assessment systems requires a clear understanding of where you are starting from as well as where you want to get to. The evidence suggests that as the Welsh Government makes this journey the following elements of practice from high performing systems should be considered, although it is recognised that the Welsh Government has already begun the process of reform and is in the process of implementing a number of the key characteristics of high performing systems:
 - Further research would be beneficial, using surveys, focus groups and case studies to establish a baseline evaluation of teacher practice, attitudes, knowledge and behaviours.
 - Collecting a range of robust baseline measures would allow effective monitoring and evaluation of both the processes and impact of curriculum and assessment arrangements. This in turn would provide valuable evidence to inform future policy.
 - Teacher support and continuing professional development is crucial to ensure a shared understanding of standards and to develop teaching and learning pedagogy.
 - Significant development of practitioner skills and competencies would be valuable to develop reflective practice and assessment literacy.
 - Consideration should be given to a range of teacher development approaches from direct training to peer coaching and the development of teacher learning communities to explore and develop good practice.

¹ Teaching makes a difference - Leighton Andrews, 2 February 2011.
<http://wales.gov.uk/docs/dcells/publications/110202teachingmakesadifferenceen.pdf>

- A number of high performing countries, notably Finland, have for many years adopted an active policy of early intervention to tackle underachievement.

1 Introduction

- 1.1 NFER and Arad Research were commissioned by the Welsh Government to conduct a rapid evidence assessment, designed to explore the impact of curriculum and assessment arrangements within five high performing countries, as identified according to their students' attainment in studies such as the Programme for International Student Assessment (PISA). The study involved systematic searching and a best-evidence approach to the selection of literature and looked in particular at evidence relating to the education systems of five high performing countries, namely Canada, Finland, Korea, New Zealand and Singapore. These countries were selected by the Welsh Government for investigation as they were the top five scoring nations across all three domains from PISA 2009.
- 1.2 The aim was to undertake a rapid evidence assessment of academic and other published literature on the impact of curriculum and assessment arrangements within high performing PISA countries. The study was intended to examine the curriculum and assessment arrangements in high performing countries, to illustrate how the various countries have made the journey to their current high performance and, where possible, highlight evidence that might support Wales in developing its school improvement agenda journey and facilitate policy learning.
- 1.3 A key aim of the study, therefore, was to highlight good practice and relate it to the Welsh context.
- 1.4 In terms of curriculum, we focused on the following areas:
- any consensus on 'what good looks like'
 - the degree of flexibility existing in terms of compulsory core subjects and optional subjects, and choice within subjects
 - how literacy and numeracy are integrated into the curriculum and
 - what other core skills are included.

- 1.5 In terms of assessment practices, we focused on the following areas:
- The ‘what, when and how’ in terms of statutory assessment: teacher assessments, accountability testing and monitoring².
 - Any indication of how the assessment interacts with curriculum.
 - How assessment impacts upon standards (if the evidence existed within the literature).
 - Any indication of how moderation and control works (if it existed within the literature).
- 1.6 This report presents the findings of our literature searches and their relationship to the current context in Wales. As a rapid evidence review, twenty studies were identified and prioritised – the resulting evidence is therefore not exhaustive and in places some aspects could not be addressed. Where possible, additional sources have been included in order to provide detail and example. A full description of the methodology and search strategy is presented at the end of the report in Appendices 1 and 2.

² Please note: Although we have included Canada as one of the high performing countries, there is no national curriculum and individual provinces have a high degree of autonomy. Depending on the information available, in the selected documentation, there are instances where illustrative examples from individual provinces have been included which are not representative of the country as a whole.

2 Curriculum arrangements in high performing countries

- 2.1 This chapter presents the findings from the selected literature about the curriculum in high performing systems. It begins by looking at the content of the curriculum for students aged 8 to 14 years and how it is defined in those countries in terms of subject coverage and key competencies and overall approaches to learning. It goes on to consider the degree of flexibility afforded to schools in delivering the curriculum and examines the extent to which literacy and numeracy are promoted in each country and integrated into their respective curriculum systems. This review is concerned with investigating the literature that deals with the impact of curriculum and assessment arrangements on performance but, of course, these cannot stand alone and there are other key features which need to be present in the system but which are beyond the scope of this review.
- 2.2 The OECD report, *Strong Performers and Successful Reformers in Education* (2011), examines how the countries at the top of the PISA tables have managed to achieve sustained high performance or to significantly improve the performance of their education systems. It aims to develop a deeper understanding of historical and cultural contexts, education systems and policy trajectories.
- 2.3 This report states that:
- the quality of an education system cannot exceed the quality of its teachers and head teachers
 - the development of supportive and effective leadership systems and leaders is a key element of delivering this quality
 - that it is necessary for policy makers to ensure an outward orientation of the system
 - to keep the system evolving and
 - to recognise challenges and potential future threats to current success.

- 2.4 The same report defines superior performance of education systems as:
- high participation, high quality, high equity and high efficiency,
- 2.5 and notes that every one of the high performing education systems³ is focused on
- the acquisition of complex, higher-order thinking skills
- 2.6 and, in many cases:
- on the application of those skills to 'real world' problems.
- 2.7 All of the above are important themes to bear in mind when reflecting on the information that follows and on the future direction for the Welsh Government.

What does a good curriculum look like?

- 2.8 Curriculum documents of the five selected high performing countries (Canada, Finland, Korea, New Zealand and Singapore) were examined.

Curriculum content

- 2.9 In terms of curriculum, some slight differences between countries were noted in the exact subjects (and their nomenclatures) that appear on the curricula for 8 to 14 year olds and beyond.
- 2.10 However, it is clear that core elements in each of the systems include:
- literacy in the home language/first language (L1) (including literature)
 - mathematics at the core of the curriculum
 - science (general).
- 2.11 Each country also included elements of:
- social studies: including humanities, history, geography, environmental studies
 - arts: including music, visual arts, drama, art and craft

³ As profiled in PISA 2011

- technology: including ICT (its use and application⁴), design, home economics
- physical education.

2.12 Most, but not all, countries included aspects of:

- modern foreign languages⁵
- civics⁶
- religion
- health/personal social and health education
- ethics/moral education
- optional activities
- extracurricular activities.

2.13 A summary overview of the 8 to 14 curriculum subjects in the selected high performing countries is shown in Table 1.

⁴ The definition of ICT across countries varies slightly. For example, in Alberta the ICT curriculum provides a broad perspective on the nature of technology, how to use and apply a variety of technologies, and the impact on self and society. In Singapore the aim of the curriculum is for students to be technologically adept as effective citizens, and to function and contribute effectively in an increasingly technologically-driven world.

⁵ Canada, Finland, New Zealand and Singapore each have more than one national language. The curricula reflect this but there is variation in how foreign languages are specified. For example, in New Zealand (where English, te reo Māori, and New Zealand sign language are national languages) it is up to schools to decide which foreign languages are offered. In Singapore, English is the language of instruction and primary school pupils also study their home language (mainly Chinese, Malay or Tamil).

⁶ The subjects covered by civics are similar to Personal and Social Education in Wales, including citizenship and personal development. For example, in New Zealand, 'social sciences' covers the topics of identity, culture and organisation; places and environment; continuity and change; and the economic world. And in Singapore, the two subjects of 'social studies' and 'civics and moral education' focus on: understanding self, Singapore, Southeast Asia, and the world; and, respect, responsibility, integrity, care, resilience and harmony.

Table 1 Subjects in the compulsory phase curriculum

	First language	Mathematics	Science	Geography	History	Modern foreign language	Physical education	Art	Music	Civics	Other mandatory subjects 6-16 years
Canada	6-18	6-18	6-18	(Social studies) 6-18			6-18	6-12	6-12	6-18	Health / Career & Life Management, 6-18
Finland	7-16	7-16	7-16	7-16	7-16	7-16	7-16	7-16	7-16	7-16	Second national language (Finnish/Swedish) Environmental and natural studies health education RE/ethics social studies craft home economics
Korea	6-15	6-15	8-15	(Social studies) 8-15		8-15	8-15	8-15	8-15	8-15	Disciplined life, 6-8 Intelligent life, 6-8 Pleasant life, 6-8 Orientation programme, 6-8 Practical arts/home economics, 10-15
New Zealand	5/6-16	5/6-16	5/6-16	Humanities and Social science 5/6-16		5/6-16	5/6-16	5/6-16			Technology, 5/6-16
Singapore	6-16/17	6-16/17	8-16/17	12-14	12-14	6-16/17	6-16/17	6-14	6-16/17	6-16/17	Humanities Other options: Design Technology 12-14 Social studies, 6-14 Health education, 10-12

NB: In each of these countries, ICT is taught across the curriculum, and some e.g. Canada also include ICT as a distinct subject.

Sources: Sargent *et al* (2013), UNESCO-IBE (2012), Government of Alberta (2013a)

- 2.14 In Korea, all core subjects are divided into different levels of study according to ability, and the curriculum specifies optional activities and extracurricular activities that schools may offer (Schmidt *et al.*, 2009).
- 2.15 Although the curriculum is structured slightly differently in each of the high performing countries studied, the overall coverage is broadly similar with slight differences in terminology.
- 2.16 In addition to individual subjects, each of the examined countries have defined a number of 'key competencies' and overarching themes which schools are expected to address. These vary in focus and detail and are discussed in the sections that follow.

Skills and competencies

- 2.17 There is evidence, internationally, of a move towards more skills-based curricula that are focused on identifying and defining essential overarching competencies alongside the more traditional subject-based curriculum content.
- 2.18 Internationally, there is a general recognition that the pace of change in modern society requires learners to develop skill sets that will enhance their capacities to discern and react to novel and complex situations. An observable trend is, therefore, to move away from "prescriptiveness" of curriculum content and towards diversity and variation of context.
- 2.19 Generally speaking competencies are regarded as a defined set of knowledge, attitudes, experience and behaviours, while the skills may be considered as constituent units of a competence, i.e. a specific capacity, often technical in nature – the ability to do something well.
- 2.20 In the literature, a distinction is sometimes made between skills and competencies, however in many instances the terms are used interchangeably, for example in the OECD Survey of Adult Skills.

2.21 The precise definitions of skills and competencies both vary and overlap across the focus countries but, in general, both terms are used to refer to the ability or capacity of a learner to act appropriately in a given situation by applying knowledge, using cognitive and practical strategies guided by a set of beliefs and values. Skills and competencies are not related to any particular context or performance.

2.22 Although expressed differently in the policy documents of each of the high performing countries, there is a common, general aim to develop in their learners the necessary attitudes, values, skills and knowledge they need in order to achieve success and fulfilment as engaged thinkers and ethical citizens with an entrepreneurial spirit.

2.23 For example, in the EU, eight key competencies have been defined, which represent a combination of knowledge, skills and attitudes that are considered necessary for personal fulfilment and development, active citizenship, social inclusion and employment.

2.24 These are:

- communication in the mother tongue
- communication in foreign languages
- mathematical competence and basic competence in science and technology
- digital competence
- learning to learn
- social and civic competences
- sense of initiative and entrepreneurship
- cultural awareness and expression.

(Eurydice, 2012)

2.25 Internationally, the adoption of the broad concept of key competencies has been accompanied by a number of variations in the specific terms and the exact content of the set of competencies or skills that are being developed.

Depending on the country and context, policy documents make reference to 'core competencies', 'basic' or 'key' skills and other similar terms.

2.26 Parsons and Beauchamp (2012) also note that 'although there are many definitions around the words "competency" and "competency-based," there is consensus that:

- competencies are capabilities people need to have in order to live, learn and contribute as active members of their communities' (p. 5).

2.27 In high performing systems this includes a specific focus on skills such as:

- problem solving
- creative and critical thinking
- selecting information
- applying knowledge and drawing conclusions.

2.28 The move to encouraging learners to develop skills across the curriculum, as part of subject syllabuses, has been accompanied by a recognition of the need for the curriculum to be broad enough to develop forms of situated learning to engage and motivate learners. This, again, can be seen as part of a wider move away from a focus on content to the underlying skills.

2.29 Parsons and Beauchamp (2012) argue that such approaches give students the opportunity to build on individual strengths and achievements, to pursue their passions and interests, and to learn in ways that are consistent with their individual ways of learning. They suggest, in turn that this increases students' engagement, motivation and self-confidence, leading to higher levels of achievement.

2.30 Ruddock and Sainsbury (2008) also note that there is a growing emphasis on problem solving and on the development of students' metacognitive awareness of their own thinking processes, both in the overarching rubric and in the detail of those curricula.

2.31 In Wales, the Skills Framework for 3-19 year olds in Wales⁷ was introduced in 2005. Although not a curriculum framework, it was designed to underpin the National Curriculum Subject orders and teaching and learning in all subject areas. The skills framework in Wales, however, is non statutory.

2.32 The Estyn report *The Skills Framework at Key Stage 2* (2011)⁸ identified the need for schools to recognise that skills such as literacy and numeracy should form the core elements of any school curriculum and the National Literacy and Numeracy Framework (LNF) aimed at promoting the development of literacy and numeracy skills across the curriculum will be a statutory curriculum requirement from September 2013.

2.33 Key competencies identified within the Welsh Curriculum⁹ include:

- English / Welsh / literacy / reading
- mathematics / numeracy
- science
- modern foreign languages
- digital competence / ICT
- social and civic competence (including sex and relationships education and citizenship)
- initiative, entrepreneurship and enterprise education.

2.34 Conceptually, these are broadly in line with those described in the curricula of the high performing countries as shown in Table 2, although the definitions, terminology and nomenclature varies slightly from country to country.

⁷ See

http://wales.gov.uk/dcells/publications/curriculum_and_assessment/arevisedcurriculumforwales/skillsdevelopment/SKILLS_FRAMEWORK_2007_Engli1.pdf?lang=en

⁸ <http://www.estyn.gov.uk/english/docViewer/205514.4/the-skills-framework-at-key-stage-2-july-2011/?navmap=30,163>

⁹ Further details of Key Competences in the curriculum in Wales can be found here: https://www.nfer.ac.uk/shadomx/apps/fms/fmsdownload.cfm?file_uid=28D72450-C29E-AD4D-09AF-FB9CA37D1C8B&siteName=nfer

Table 2 Key competencies as described in the curricula of each country

<p>Canada (Alberta)</p>
<p>The Albertan <i>Framework for Student Learning: Competencies for Engaged Thinkers and Ethical Citizens with an Entrepreneurial Spirit</i> (Alberta Education, 2011), was intended to provide a basis for a revised curriculum. It lists the competencies of: critical thinking, problem solving and decision making; creativity and innovation; social, cultural, global and environmental responsibility; communication; digital and technological fluency; lifelong learning, personal management and well-being; and, collaboration and leadership.</p>
<p>Finland</p>
<p>In Finland, the EU definition using eight key competencies (as outlined above) is applied. Even though the curriculum does not explicitly state that priority should be given to any of the main skills (communication in the first language; mathematical competence; basic competencies in science and technology; digital competence), the expected level for receptive skills (listening and reading) is higher than for productive skills (speaking and writing). The logic is that language skills naturally develop from receptive skills to productive skills.</p> <p>Schools in Finland have full autonomy for implementing entrepreneurship, and practice regarding this varies. Normally, it is integrated into general subjects such as social studies; schools may also organise separate entrepreneurship courses.</p>
<p>Korea</p>
<p>The Korean Institute for Curriculum and Evaluation (Lee <i>et al.</i>, 2012) has identified the need to create a competence-based curriculum out of the current subject-based one. It reports that, "future society requires people to cultivate [key competencies] to successfully adjust themselves to changing society and to use knowledge rather than accumulating knowledge." (KICE, 2012, online abstract)</p> <p>Five categories of societal change and educational need were identified which competencies should address: society (demographic change), technology (scientific and ICT development), economy (change in markets), environment (resource issues) and politics (global, pluralistic society).</p> <p>Three main categories of competency were outlined: personal competencies, intellectual competencies, and social competencies. The suggestion of the report is that the cross-curricular social and personal competencies should form one axis of a revised national curriculum with the second axis being subject areas, which represent intellectual competencies.</p>
<p>Singapore</p>
<p>The Singapore Framework for 21st Century Competencies lists:</p> <ul style="list-style-type: none"> • Core values (respect, responsibility, resilience, integrity, care, harmony); • Social and emotional competencies (self-awareness, self-management, social awareness, relationship management, responsible decision-making); and • Emerging competencies (critical and inventive thinking; information and communication skills; civic literacy, global awareness and cross-cultural skills). <p>Alongside specific subjects, Singapore also has a 'non-academic curriculum' which is defined as elements such as co-curricular activities, civic and moral education, social and emotional learning and physical education.</p>
<p>New Zealand</p>
<p>In New Zealand the curriculum is structured to cover eight broad learning areas (English, the arts, health and PE, maths, science, social sciences and technology) and five key competencies (thinking; using language, symbols, and text; managing self; relating to others; and, participating and contributing).</p> <p>These are compulsory during the ten years of statutory primary and lower secondary education (ages 5/6 to 16).</p>

Application of learning and learning to learn

- 2.35 Another important feature of the curricula in these high performing countries is the clear expectation that practitioners and students should reflect on the way skills are used and learning is applied.
- 2.36 The importance of the application of learning (using information, drawing conclusions, applying knowledge intelligently) has clearly influenced curriculum content across successful education systems. The literature suggests a move away from approaches based on the acquisition and reproduction of knowledge and a strong emphasis on the use and application of that knowledge across successful systems.
- 2.37 For example, Ruddock and Sainsbury (2008) describe the increasing tendency for students to be expected to discuss and explain their reasoning throughout their mathematical education. They note that, in Ontario for example, there is a strong emphasis on the use and application of mathematics in everyday and real life contexts. Likewise, the mathematics curriculum in Singapore has a strong focus on problem solving.
- 2.38 Ruddock and Sainsbury (2008) also note the importance of linking learning to real life situations and thereby making the learning experience more meaningful and relevant for students.

‘The primary aim of the mathematics curriculum is to enable pupils to develop their ability in mathematical problem solving. Mathematical problem solving includes using and applying mathematics in practical tasks, in real life problems and within mathematics itself. In this context, a problem covers a wide range of situations from routine mathematical problems to problems in unfamiliar contexts and open-ended investigations that make use of the relevant mathematics and thinking processes.’ (p. 98)

2.39 Curricular trends such as these are also reflected in the content of international surveys. For example, in PISA 2012 elements of problem solving and financial literacy were introduced and in 2015 the assessments will be further developed to examine collaborative problem solving, highlighting the growing value the international community is placing on these skills.

Cross curricular approach with overarching themes

2.40 A further area of evidence shows that the high performing countries studied have recognised the importance of cross-cutting approaches to curriculum development, and embedding skills and competencies across the curriculum as shown in Table 2 above.

2.41 Le Metais (2003) argued that there are shared perceptions globally that:

‘economic prosperity will increasingly depend on entrepreneurial and creative thinking and cooperative working.’

2.42 The findings of this report raised the profile of these approaches on the school curriculum and they are increasingly discussed in terms of 21st century skills.

2.43 With regard to developing civic and moral values Le Metais (2003) noted that citizenship education had become an important part of recent curricular reforms in countries such as New Zealand and Singapore as a vehicle for the introduction of more creativity, debate and discussion in the curriculum.

2.44 For example, in Singapore, the Community Involvement Programme (CIP) is an integral part of the formal curriculum and offers opportunities for pupils to put their knowledge, skills and values into practice. All students are required to participate in the CIP for at least six hours a year. This aims to nurture students to be socially responsible and help them understand that they have a role in enhancing the well-being of their community and country.

Similarly, in Canada students also undertake a prescribed number of hours of community service (Le Metais, 2003). In Singapore, in addition to the CIP programme, citizenship is covered in Civics and Moral Education. In the other countries looked at, citizenship is covered in social studies/sciences (and for Korean learners in the first two years of school citizenship is covered in the Disciplined Life strand of the integrated curriculum).

2.45 Parsons and Beauchamp (2012) highlight that many countries throughout the world (including New Zealand, Finland, Singapore, Australia and Germany) have moved to make competencies central to their educational reform efforts, specifically with a view to:

- helping their citizens engage actively in today's global, knowledge-based society and to better prepare them for the rapid changes that are occurring at local, national and international levels.

2.46 These countries thus focus on curricula which:

- display 'both a breadth and depth of knowledge and skills'. (p. 6)

2.47 The curricula in each of the five high performing countries include requirements to encourage creativity and to promote civic and moral values. In practice, these are often developed through overarching cross curricular themes such as global learning, sustainability, diversity and social justice.

How much flexibility is there in terms of curriculum?

Defining the curriculum

2.48 National curricula may be very specific and detailed, or may provide broad frameworks from which schools are expected to select the most appropriate content. The extent to which curricula in different countries is highly prescribed by the state, and the degree of teacher autonomy in selecting the content and detail of what is taught also varies between countries.

- 2.49 For example, in Korea, the curriculum is determined by national legislation which states that: schools should administer the curriculum; that the minister of education has the power to determine the standards and content of the curriculum; and that school superintendents may establish further standards and content to reflect their district's particular situation (within the limits of the curriculum set by the minister).
- 2.50 There is a statutory national curriculum in Singapore, based on defined learning outcomes (the expected attainment targets for pupils at the end of each two year period). Guidelines and suggestions on the methods of teaching are provided by central government, together with a clear statement of the intended standards of achievement.
- 2.51 The revised New Zealand curriculum, introduced between 2007 and 2010, sets out the direction for teaching and learning in New Zealand schools. Based on the Education Act 1989, it is a framework rather than a detailed plan and covers Year 1 (age 5-6) to Year 13 (age 18) and covers the same subjects throughout but at different "levels" which progress through the school years. The framework in New Zealand aims to provide common direction to schools, regardless of type, size or location, and also aims to give schools the scope, flexibility and authority they need to design and shape their own curriculum so that teaching and learning is meaningful and beneficial to their particular communities of students.
- 2.52 There are three National Core Curricula in Finland: one for pre-primary education (children aged six to seven); one for basic compulsory education (primary and lower secondary level education) (children aged seven to 16); and one for upper secondary education (young people aged 16 to 19).
- 2.53 All three curricula include the objectives and core content of different subjects, time allocations, principles of assessment, special needs education, pupil welfare and educational guidance. Education providers

(local authorities and schools) must draft their own curricula for each phase of education within the framework of the relevant National Core Curriculum.

2.54 There is no national curriculum in Canada. The country consists of ten provinces and three territories, each of which has exclusive authority for education. The ministers of education from each province (or territory) however, decide their own curricula, for example, Alberta produces programmes of study for each of the subjects that form core and optional parts of the curriculum.

2.55 There has been a gradual move in several high performing countries from a system in which students were streamed into different types of secondary schools, with curricula set to very different levels of cognitive demand, to a system in which all students now go to secondary schools with curricula set to much the same high level of cognitive demand (OECD, 2011).

2.56 However, while most countries had arrangements by which children went to common secondary schools to pursue a similar curriculum this was not the case in each one. For example, in Singapore students are placed in special, express, normal (academic) or normal (technical) courses according to how they perform in the Primary School Leaving Examination (PSLE) at age 12.

2.57 At the same time, however, it is clear from the literature that the systems which were examined have different approaches to curriculum delivery which mean that it is not possible to generalise about their content. The variations include:

- some curricula differentiate between examined and non-examined subjects
- there are variations in the number of hours per year devoted to different subjects, especially at different stages of education
- the length of the school day and term time vary across the systems
- the content of individual syllabuses vary
- the number of compulsory and non-compulsory subjects vary

- there are differences in the extent to which subjects and curriculum areas are examined
- some countries have allowed time for skills to be studied as distinct subjects (such as ICT) while others, such as Canada, have situated the development of those skills in other areas of the curriculum.

2.58 Internationally, the trend is to moving towards more broadly specified curricula with considerable school/teacher input to and ownership of the specific content, (In Wales from September 2013 the Literacy and Numeracy Framework will be statutory which will require assessment of skills across curriculum subjects.) However, the success of an approach that gives more autonomy to schools and teachers is entirely dependent on having a confident, skilled workforce. Issues relating to teacher support and training would be crucial in this matter.

Standardising resources

2.59 In the selected countries there are differences in the extent to which the state is involved in the development of teaching and learning resources to be used in the classroom.

2.60 Parsons and Beauchamp (2012) outline that, typically, in Western Europe and New Zealand, for example, governments do not develop learning and teaching resources because of the independent role of the publishing industry.

2.61 In Finland, for example, schools have a completely free choice in terms of which text books they use. In New Zealand, although the state provides (free) textbooks their use is not mandatory. In Canada and Singapore schools select from an approved list of textbooks for use in all schools and Korea is moving towards a similar system, in contrast to their previously well established system where prescribed textbooks were expected to be used

for all subjects and grades in every school. Each country's approach to text books is summarised in Table 3.

2.62 Other countries develop curriculum resources through government funded, but arms-length non-government agencies, with well-defined governance in place.

2.63 Parsons and Beauchamp (2012) also argue that there is 'evidence that many jurisdictions are moving toward a balance between a hierarchical "top-down" approach (full governmental control) and a more democratic "consensus-based" approach (co-creation with stakeholders) in curriculum development' (p. 5).

2.64 In Wales specific textbooks are not prescribed. The Welsh Government has developed a number of curriculum and assessment materials specifically designed to support learning and develop pedagogy. These have been made available to schools for certain year groups - for example suites of Teacher Assessment support materials such as the Year 5 Optional Skills Assessment Materials. The extent to which these materials have been used, however, is not clear and there is some evidence to suggest that their impact potential has been restricted due to teachers' lack of familiarity or training, and because of their optional nature (Estyn 2011b).

Table 3 Level to which textbooks are prescribed

	Textbook production	State provides list of approved textbooks	Choice of books for use in class	Textbook provision
Canada	Commercial (by approval). Provinces produce and pilot books.	Province or territory usually provides recommended list of approved titles.	District or school usually from recommended list.	School usually provides free of charge
Finland	Commercial.	No	Teachers – free choice	School provides free of charge
Korea	State, or commercial with state authorisation or approval.	Ministry compiles some and authorises or approves other textbooks.	Single textbook recently replaced by range of government-copyrighted and approved textbooks for individual subjects, enabling teachers to choose.	Provided free at primary level (6-12) (and students may keep). Thereafter, parents buy but costs are kept low.
New Zealand	State and commercial. (Learning Media, a crown-owned company, publishes a range of resources free to schools. Use is not mandatory.)	No	Teachers - free choice	School provides (loaned, parents contribute for damage or loss). Parents may buy supplementary materials, particularly at post-compulsory upper secondary level.
Singapore	State and commercial with state approval	State prescribes content and produces an annual Approved Textbook List (ATL) for primary and secondary education.	Teachers - from Approved Textbook List	Parents buy, free for those in need.

Sources: Sargent *et al* (2013), Finnish National Board of Education (2013a)

Reviewing and reforming the curriculum

- 2.65 The literature was examined to ascertain the extent to which high performing systems undertake periodic reviews of their curricula, their motivations for doing so, and the extent to which this has been identified as a factor contributing to their success.
- 2.66 Although historical background information was not readily available in the selected documents, the need to review the curriculum to take account of the changing demands on the education system appeared to be recognised by the countries examined.
- 2.67 For example, in Korea, the curriculum has been reviewed periodically since the mid-1950s, Singapore has implemented on-going, systematic reviews of its curriculum while in New Zealand and Canada similar work has been undertaken since the 1980s in response to discussions about the education systems and their performance. In Finland, review and revisions to the curriculum are expected at the local level by local education authorities and schools.
- 2.68 Historically, the Welsh Government has also undertaken regular curriculum reviews and consulted widely with a number of stakeholders, maintaining an outward orientation as recommended in the OECD 2011 report.

Drivers for curriculum reform

- 2.69 Economic imperatives are clearly important drivers of curriculum reform. For example, in Singapore government education planning targets are set in line with manpower planning and long term economic and social development strategies.
- 2.70 Similarly, in South Korea the government aims to increase the proportion of middle school graduates moving on to high school, partly for economic reasons.

2.71 However, economic considerations are not the only drivers for curriculum reviews. Others include:

- political/government change
- a process to rebalance or slim down the curriculum to combat what has been described as curriculum overload
- a process to review the curriculum to focus on the knowledge and skills young people will need in the future
- reviews to tailor the curriculum to take account of modern social or pedagogical developments
- acknowledgement of the impact of globalisation or changes in technology and communication.

Sargent *et al* (2010)

2.72 These drivers echo the findings of O'Donnell (2001) who found that although the aims and purposes of curriculum review vary from country to country many of the countries emphasised that curriculum review was often undertaken in their country with a view to modernising the system to take account of recent educational, social or pedagogical changes.

Good practice in curriculum reform

2.73 In most countries, curriculum review is led by ministries of education (or their equivalents) either at national, state or regional level. This process can also involve a range of key stakeholders such as national and regional councils, professional bodies working in education and training, schools and teacher and parent representative organisations. There is inevitably a degree of political involvement in curriculum reviews in most countries however the review process appears to be democratic and open to political debate.

2.74 In Korea, curriculum reviews are led by central government with considerable involvement by educational research institutions and committees of experts.

Likewise, in Singapore practitioners, business and community leaders and others are involved in curricular reviews.

- 2.75 Consultation with a range of stakeholders, including learners, is common in high performing countries and has also been the case in Wales. If further consultations are planned, the review might benefit from the inclusion of pupil voice as well as seeking input from industry and employers alongside the more traditional contributors represented in educational consultations.
- 2.76 Internationally, there is also a growing focus on using research evidence to develop education systems. In a study of Alberta, Parsons and Beauchamp (2012) consider that, within the learning system, educators must continue to make use of research (e.g., theoretical foundations, qualitative and quantitative studies and what is occurring in practice) to improve their understanding of curriculum and instructional processes.

Contextual and philosophical underpinnings

- 2.77 Due to the limited scope of this study, it is not possible to examine the social, political and cultural influences that have impacted on the development of the curriculum in each of the identified high performing systems. However, it must be recognised that the selected countries differ in terms of the aims of education, how schools should operate, and different traditions of teaching methods.
- 2.78 For example, both Korea and Singapore have a history of rigid pedagogical approaches, with prescribed content and considerable uniformity in the materials used to support teaching and learning.
- 2.79 Since 1997, however, the systems in these countries have sought to make schools more learner-centred and have emphasised the need to focus on creativity and self-expression and have also increased the amount of autonomy enjoyed by learners and schools.

2.80 On the other hand, in Canada during the 1980s, there was a move against the 'progressive' educational reforms of the 1960s and 1970s. Concerns were expressed about the education system in New Zealand during the 1980s and 1990s which led to a focus in numeracy in particular. Further research would be required to obtain a deeper understanding of the aims set for these systems and to address questions such as:

- whether the detail and specification of overall aims contribute to success and to what extent moves such as increasing learner autonomy contribute to success
- the influence of the context and cultural expectations that are implicit in the statements of overall aims, and the meaning of notions such as 'creativity' and 'individual expression' in different countries.

2.81 A further range of issues gaining prominence in the international education community relate to equity and equal opportunities, rights and responsibilities within the context of educational provision. The Welsh Government has shown that it is committed to these principles by adopting the UNCRC¹⁰ but may wish to reflect further on these issues when planning their forward journey.

How literacy and numeracy are integrated into the curriculum

2.82 The literature examined contains little direct reference to the way literacy and numeracy are integrated into the curriculum. Not surprisingly, both subjects feature as core elements of all the curricula examined.

2.83 The INCA report (2011) did not focus on the integration of literacy and numeracy *per se*, but it did draw comparisons between the delivery of English and mathematics in high performing countries. It found that English was diverse in terms of the content specified and how this content is presented, although a common feature is an emphasis on different modes of communication (reading, writing, speaking and listening) and literature.

¹⁰ United Nations Convention on Rights for the Child

2.84 These different modes of communication feature in the current Skills Framework (3-19) in Wales and in the new Literacy and Numeracy Framework (LNF) in which literacy (oracy, reading and writing) is also intended to be developed across the curriculum.

2.85 The Singaporean curriculum explicitly includes an integrated approach to literacy. It states that literacy acquisition is dependent on the integrated teaching of listening, reading, viewing, speaking and writing, and the engagement of learners because,

‘What pupils know about, they can talk about; what they can talk about, they will read and write about’.

(p. 287).

2.86 Mathematics meanwhile invariably includes the domains of number, geometry and measures, and data and statistics during the primary phase, and this is extended to the domains of algebra and probability during the secondary phase. Mathematical processes related to mental and written fluency, problem solving, and mathematical reasoning are also standard domains, although their presentation varies (INCA, 2011).

2.87 Within the current curriculum in Wales, and in the LNF, it is recommended that numeracy is taught across the curriculum, developing problem solving and thinking skills by relating learning to real life contexts. This is in keeping with features of superior performance outlined in the OECD report and summarised at the beginning of this chapter.

2.88 As noted by Ruddock and Sainsbury (2008) in relation to numeracy, successful systems expect teachers to:

‘plan programs in which connections are made between mathematics and other subjects to enable students to broaden their knowledge in other subject areas

(p. 96).

2.89 An example of this is would be the problem-solving approach which underlies the whole of the Ontario mathematics curriculum¹¹.

2.90 As discussed in 2.1.2, it is also clear that many of the skills associated with both literacy (reading, accessing information, drawing conclusions from different sources) and numeracy as distinct from mathematics (reasoning, problem solving, logical reasoning) feature as key elements of the skills and competencies identified in high performing systems. These are also prominent in the current curriculum in Wales and in the LNF.

Cross-curricular learning in real life contexts

2.91 The move to forms of situated learning through a broad curriculum that stimulates and interests learners, identified across high performing systems, offers a means of embedding literacy and numeracy in a range of different contexts across the curriculum.

2.92 Parsons and Beauchamp (2012) contend that:

‘interdisciplinary experiences enhance student engagement and student learning, and serve to bridge knowledge and meaning making with 21st century skills and attitudes’

(p. 11)

2.93 They consider that this depends on an integrative curriculum that unites core academic subjects and competencies with instructional approaches in which pedagogies, technologies, resources and contexts come together. According to them, this means therefore ‘moving away from the notion of isolated subject and discipline areas to learning that resides in real-world contexts and involves students using competencies to engage in meaningful learning’.

2.94 A similar approach was promoted in Wales and incorporated in a range of materials provided for schools by the Welsh government; for example the

¹¹ See <http://www.edu.gov.on.ca/eng/curriculum/elementary/math18curr.pdf>

Optional Skills Assessment Materials. Anecdotal evidence has indicated that there are pockets of excellent practice, particularly in primary schools, but the extent to which the practice is widespread is unknown. Further research to establish patterns of practice across educational sectors/phases would provide sound evidence on which to build future policy and plan support for schools.

3 Assessment arrangements in high performing countries

- 3.1 This rapid evidence assessment draws together evidence from high performing education systems across the world. It focuses on what is assessed in the five identified countries, how assessments are undertaken and when they are conducted. It then considers the evidence about how assessment interacts with the curriculum and its impact on standards.
- 3.2 The evidence needs to be considered with great care as it comes from a range of countries each with their own unique context that may or may not reflect that of Wales. As Le Metais (2003) noted in her overview of the INCA¹² project, the fundamental basis of the INCA project was not to identify the ‘best’ education system and that ‘strategies that appear to be successful in one country must be critically examined before being adapted and developed elsewhere’ (p. 246). She points to the need for due consideration to be given to national values, priorities and contexts during all such exercises. She also notes that there is ‘seldom a clear definition of what ‘world class’ means in the national context’ (p. 235). These issues are clearly relevant to this discussion about what Wales can learn from the assessment arrangements of other countries.

What is assessed?

- 3.3 Literacy and numeracy are the foundation stones of the assessed curricula across the high performing countries examined as part of this review. They form a common core upon which the rest of the curriculum and assessment are based. They are integrated into a broader core curriculum which gives a prominent place to science and social studies as well as English (Andrews *et al.*, 2007).
- 3.4 In Canada, each province sets its own curriculum and assessments but there is a national assessment to allow national monitoring and maintenance of standards. The curriculum which is included in the Pan-Canadian Assessment

¹² INCA is the International Review of Curriculum and Assessment Frameworks which, from 1996 to 2013, provided descriptions of government policy on education in 21 countries worldwide (including Canada, Korea, Singapore and New Zealand. Finland was not included.)

Program (PCAP) covers reading (in either English or French first language), mathematics and science and was designed to align with international assessments such as PISA, to set a higher standard for the provincial assessments given each year across Canada (within each province) and to respond to provincial curricular changes (Schmidt *et al.*, 2009).

- 3.5 The Pan Canadian Assessment Program (PCAP) is modelled on PISA, and is conducted by the Council of Ministers of Education Canada – an organisation of Provincial ministers. It is administered on a three yearly cycle to about 30,000 randomly selected students from about 1,500 schools who are 13-year-olds at the start of the school year, to assess reading, mathematics, and science, in either English or French. The results compare students' performance in core disciplines in the ten provinces and are intended to complement other provincial assessments. Provincial ministers of education have a basis for examining Curriculum and their school systems, while comparing with other provinces.
- 3.6 The first PCAP assessment was administered in the spring of 2007 and the major domain was reading. The second was in 2010, where the major domain was maths. PCAP 2013 will have science as the major domain.
- 3.7 Canadian provinces develop their own standardised tests. For example, Ontario has an independent organisation called the Education Quality and Accountability Office (EQAO), which is devoted to improving quality and accountability for government decision making and public good. The EQAO conducts assessments and publishes results for the public. These results are used widely by those in the education sector for in-school improvement, feedback to schools and comparing progress over time. In Ontario, student progress is tracked for schools and individuals and is measured at Grades 3, 6 and 9 (ages 8, 11 and 15).

Table 4 National standardised assessment systems

	National standardised assessment system	Cohort or sample* ¹³	At school entry	During compulsory primary education	During compulsory secondary education	Participation in international surveys			Purpose of the national assessment	Assessment methods
						PISA 2012 ¹⁴	PIRLS 2011 ¹⁵	TIMSS 2011 ¹⁶		
Canada	Yes Pan-Canadian Assessment Program (PCAP)	varies by province (see examples, below). At national level (PCAP), a sample is tested.	No	Not at national level but all provinces have assessments.	At national level: age 13 (PCAP): first language, mathematics, science. (since 2007) And at 16.	✓	✓	x	Monitoring at the level of the province and nationally	
Alberta, Canada	Provincial (Provincial Achievement Test - PAT)	cohort	No	Age 8 - first language, mathematics Age 11 - first language, mathematics, science, social studies	Age 14 - first language, mathematics, science, social studies	✓	✓	✓	Monitoring at the level of the school, district and province.	Multiple choice, except the test of writing.

¹³ In cohort testing all students in the cohort are assessed and results can be used at system level or for school or student level information. In other cases, a representative sample of students is selected to provide a 'snapshot' of performance for system level monitoring.

¹⁴ Programme for International Student Assessment (PISA) <http://www.oecd.org/pisa/>

¹⁵ Progress in International Reading Literacy Study (PIRLS) <http://timssandpirls.bc.edu/>

¹⁶ Trends in International Mathematics and Science Study (TIMSS) <http://timssandpirls.bc.edu/>

	National standardised assessment system	Cohort or sample* ¹³	At school entry	During compulsory primary education	During compulsory secondary education	Participation in international surveys			Purpose of the national assessment	Assessment methods
						PISA 2012 ¹⁴	PIRLS 2011 ¹⁵	TIMSS 2011 ¹⁶		
Ontario, Canada	Provincial (Provincial Test)	Cohort	No	Age 8 - literacy and maths tested at the end of the primary division. Age 11 - literacy and maths tested at the end of the junior division.	Age 14 - maths tested in the first year of secondary school; Age 15 - literacy tested as a graduation requirement	✓	✓	✓	Monitoring at the level of the school, district and province.	Multiple choice and constructed response items.
British Columbia, Canada	Provincial (Foundation Skills Assessment - FSA)	Cohort	No	Age 9 - reading, writing and numeracy	Age 12 (as at age 9)	✓	x	x	Monitoring at the level of the student, school, district and province.	Computer-based, and paper-based with multiple choice and constructed response items.
Finland	No	National evaluations make use of assessments carried out by a sample of schools, using their own evaluation models, methods and indicators.		Teachers set their own assessments based on national core curriculum descriptors of 'good' performance.		✓	✓	✓	Monitoring at the national level	Continuous teacher assessment and the development of learners' capabilities for self-assessment.

	National standardised assessment system	Cohort or sample* ¹³	At school entry	During compulsory primary education	During compulsory secondary education	Participation in international surveys			Purpose of the national assessment	Assessment methods
						PISA 2012 ¹⁴	PIRLS 2011 ¹⁵	TIMSS 2011 ¹⁶		
Korea	Yes National Assessment of Educational Achievement (NAEA)	Cohort	No	Age 12 - first language, mathematics, English, social studies, science	Ages 15, 16 - also NAEA	✓	x	✓	Monitoring at the level of the student, school, region and nationally.	Multiple choice and constructed response items (e.g. the English test has 34 multiple choice items and 6 constructed response items).
New Zealand	Yes National Monitoring Study of Student Achievement (NMSSA)	Sample	Age 5/6	Ages 8/9 - different subjects each year: mathematics, physical education, science, English, arts, technology, social science, modern foreign languages	Ages 12/13 - also NMSSA	✓	✓	✓	Monitoring achievement at the national level.	“Survey assessments” such as pen and paper tests appropriate to the subject, and background questionnaires “In-depth assessments” used to assess all areas which are one-to-one or team performance assessments.

	National standardised assessment system	Cohort or sample* ¹³	At school entry	During compulsory primary education	During compulsory secondary education	Participation in international surveys			Purpose of the national assessment	Assessment methods
						PISA 2012 ¹⁴	PIRLS 2011 ¹⁵	TIMSS 2011 ¹⁶		
Singapore	Yes	Cohort	No	Age 10 - English, first language, mathematics, science Age 12 - Primary School Leaving Examination (PSLE) in same subjects as at age 10		✓	✓	✓	Determines pupils' secondary school admission	(PSLE) Multiple choice and open ended, plus oral and writing test for languages.

Sources: Sargent *et al* (2013), Council of Ministers of Education, Canada (2013), Government of Alberta (2013b), Education Quality and Accountability Office (2013), Province of British Columbia (2013), Finnish National Board of Education (2013b), Korea Institute for Curriculum and Evaluation (2013), University of Otago (2012), Ministry of Education, Singapore (2013)

- 3.8 The province of British Columbia links its Foundation Skills Assessment (FSA) scale to the PISA scale in order to make comparisons. Cartwright *et al* (2003) found that the FSA reading tests sat by 15 year olds was set to a standard that was higher than the PISA standard (also sat by 15 year olds).
- 3.9 In Singapore there is a national examination at the end of primary education where performance is assessed in: the first language¹⁷, English, mathematics and science (Schmidt *et al.* 2009).
- 3.10 In Finland, teachers carry out assessment in their respective subjects on the basis of objectives and assessment criteria written into their local curriculum. Assessment is an ongoing part of daily school life and each pupil receives a report at least once every school year. In addition, an intermediate report may be given at least once during the school year.
- 3.11 Achievement is assessed both continuously and through tests set by teachers. The national core curriculum also includes the descriptions of good performance (grade 'good' or 8) in all common subjects. These are meant for teachers as a tool and support. A certificate is awarded when a pupil successfully completes the full nine years of comprehensive schooling; an additional certificate is awarded for those completing the optional tenth year.
- 3.12 In Finland, national student performance is evaluated on a sample basis by the Finnish education authorities at the end of the second and ninth grades (age 6 and 15 years) to inform curriculum and school investments. All other assessments are designed locally, based on the national curriculum (Darling-Hammond, 2010).
- 3.13 While it has not been possible to codify each non-statutory individual subject which forms part of the curriculum assessed in each of the countries examined, it is clear that in some, the assessment is designed to give children and young people opportunities to be creative and to express themselves, rather than recalling facts. This is particularly prominent in Finland and there is evidence

¹⁷ Typically Chinese, Tamil, Malay, but also includes other south Asian languages

that some other countries are moving towards assessments that give children and young people the freedom to develop creative ways of thinking, solving problems, and working with others.

Assessing skills and competencies

- 3.14 As discussed in the section *What does a good curriculum look like?* above, many successful countries have moved towards a focus on skills alongside content. This definition of skills has included placing a focus on the extent to which learners are able to solve problems, think critically and creatively, and to apply knowledge in a range of different contexts.
- 3.15 Parsons and Beauchamp (2012) argue that for assessment to be meaningful to students, it needs to provide information that 'moves learning forward'. They contend, therefore, that 'competency-based approaches' help educators understand what students know and what their level of knowledge and skills is. Competency-based approaches also permit assessments to be more authentic and purposeful and for students to be involved in the process (p. 9).
- 3.16 Most assessments used in Finland include problem solving tasks and written tasks that ask students to apply their thinking. The language tests have a textual skills section that evaluates students' analytical skills and linguistic expression, and they are required to produce an essay that focuses on the development of thinking, linguistic expression and coherency (Darling-Hammond, 2010).
- 3.17 The Finnish tests use mostly open-ended questions to evaluate skills including problem solving, analysis, and writing. They also incorporate questions that cross disciplinary boundaries (Darling-Hammond, 2010). Assessment is therefore used in Finland to cultivate students' active learning skills by posing complex problems and helping students address these problems. The cultivation of independence and active learning allows students to focus on broad knowledge with an emphasis on skills such as analytical thinking,

problem solving, and metacognitive skills that develop students' thinking (Darling-Hammond, 2010).

3.18 Similarly, recent reforms are changing the Singaporean curriculum and assessment system to make it more explicitly focused on creativity and independent problem solving. Many courses include applied examination elements that allow students to demonstrate how they can solve problems in performance tasks (Darling-Hammond, 2010).

3.19 Since the introduction of the *Thinking schools, Learning nation* initiative in 1997, Singapore's focus in its reforms of curriculum, assessment, and teaching has been to develop a creative and critical thinking culture within schools, by teaching and assessing these skills and by creating an inquiry culture among teachers. Teachers are also encouraged to conduct action research¹⁸ on their teaching. This initiative was coupled with commitments to integrating technology into all aspects of education and to dramatically opening up college and university admissions (Darling-Hammond, 2010).

3.20 The newer areas of Life Skills and Knowledge Skills in Singapore are intended to develop the more advanced thinking skills thought to be underrepresented in the traditional content-based curriculum and examinations system. The 'content' courses are also evolving to include more critical thinking, inquiry and investigation, along with mastery of content. A number of the high school content tests are accompanied by school-based tasks, such as research projects and experiments designed and conducted by students (Darling-Hammond, 2010).

3.21 The move towards assessing a broader range of skills evident in Finland and Singapore is mirrored in other successful countries. For example, New Zealand and Japan have introduced processes to assess motivation and life skills which

¹⁸ Action research is a method of enquiry which seeks a better understanding and improvements by participation and collaboration, rather than observation or other methods which separate the researcher from the process they are investigating.

examine the extent to which students are able to apply their knowledge, solve problems and think creatively.

How is it assessed?

3.22 The extent to which different countries use external tests or teacher assessment for summative and monitoring purposes varies considerably across both high and low performing countries worldwide. Increasingly, many countries use the results of international surveys such as PISA, PIRLS or TIMSS to monitor and evaluate their education systems whilst using more frequent assessments, varying in form from external standardised tests to moderated teacher judgements to inform school-centred decisions and the teaching and learning of individuals.

Methods of assessment

3.23 There is strong evidence that compulsory, criterion-referenced assessment systems using standards set at a national level, are used across the high performing education systems examined in this study.

3.24 As the OECD concluded, all of the high performing countries that they profiled had developed world-class academic standards for their students and their existence was seen as a consistent predictor for the overall performance of education systems (OECD, 2011).

3.25 There are a number of benefits identified in the literature for maintaining nationally-set assessment criteria. These can be summarised as:

- they enable diagnostic, formative assessment to identify areas of improvement, and to feed back to students
- the assessment of students' progress against national targets and standards to enable schools to compare their performance with nationwide results
- such assessments are used to facilitate students to progress to the next phase of education.

3.26 Filmer-Sankey *et al.* (2010) found that three main methods of assessment were used within the successful systems. These were:

- continuous school-based assessment
- standardised national assessments
- national sample surveys¹⁹.

3.27 As Table 4 shows it is common practice in high performing countries to use standardised national assessments, undertaken at a designated age, alongside assessment undertaken during a course. Four out of our five high performing countries use nationally standardised assessments based on tests. Only Finland use summative teacher assessment. However, these teacher judgements are based on a long established tradition and high levels of teacher assessment literacy and professionalism.

3.28 Of ten countries²⁰ examined by Filmer-Sankey *et al.*, 2010, eight had adopted this approach and assess by means of standardised national or provincial tests which are used in addition to continuous school-based assessment.

3.29 This evidence echoes a previous study by Andrews *et al.* (2007) which reported on the nature of the compulsory assessment system of 20 countries. They found that almost all countries had a compulsory assessment system although this had only recently been introduced in a handful of these countries. The two exceptions were Switzerland (which had a project underway intended to lead to standards and tests) and Japan (it carries out periodic surveys; and the first national survey since the 1960s, undertaken in 2007, was expected to be repeated).

¹⁹ National sample surveys are designed to provide a 'snapshot' of national performance in a chosen subject area by administering a test, or tests, to a representative sample of students (as opposed to an entire cohort). These are often used to inform policy decisions at national or regional levels. They are less useful for school level decisions or to inform the teaching and learning of individuals or groups.

²⁰ includes Ontario, Canada

3.30 In Wales, as of the summer term 2013, reading and numeracy will be assessed by standardised tests in full cohorts in every year group from years 2 to year 9 (ages 6 to 14 years).

Setting the criteria

3.31 In most cases, Singapore, Korea, Finland and in some Canadian provinces, assessment criteria are drawn up centrally through consultation with subject experts.

3.32 The New Zealand system, however, features the devolution of assessment to the students themselves. For example, the assessment framework emphasises the development of students' own capacity to regulate their learning through self- and peer-assessment. This approach can increase students' autonomy, and help to develop a team spirit in collaborative work with peers (OECD, 2011).

3.33 Le Metais (2003) notes that New Zealand (like other countries such as Australia and England) has created a qualifications framework to accredit students learning within or outside the formal education system.

3.34 In Finland no standardised tests are used. Teachers carry out assessments in their subjects based on objectives and assessment criteria (similar to level descriptions) in the National Core Curriculum for Basic Education (Ginsburg *et al.*, 2009). Practising teachers design and mark assessments based on recommended assessment criteria and benchmark each subject and grade within the national core curriculum (Darling-Hammond, 2010). This is regarded as important continuous professional development and critical to enhancing teachers' assessment literacy and capacity to implement assessment for learning in the classroom.

3.35 Hendrickson (2012) notes that the 2004 Finnish national curriculum provides guidance for evaluation of students in early grades and throughout basic education, with assessments taking place during the course as well as through

a final assessment. These assessments are undertaken on the basis of student and teacher interactions which provide evidence for the assessment of aspects such as behaviour and work skills as well as content knowledge.

Sampling

- 3.36 In those countries where national tests are used, there is some variation in whether all students take the test (cohort testing) or whether a proportion are tested to gain a 'snapshot' of average performance.
- 3.37 In Canadian provinces, for example, Alberta, British Columbia and Ontario, and in Singapore, whole cohorts of students are tested. However, others use national sample surveys of a sub-set of learners (e.g. Finland, Canada which samples across all the provinces (PCAP) , Korea which assesses a small sample of 0.5-1% and New Zealand which assesses a sample of 3%) (Filmer-Sankey *et al.*, 2010).
- 3.38 In New Zealand there are no full-cohort national tests, and teachers are given prime responsibility for assessing their students' learning based on a range of evidence (OECD, 2011).
- 3.39 In Finland, student performance is evaluated on a sample basis by the education authorities at the end of second and ninth grades to inform curriculum and school investments (Darling-Hammond, 2010).

Assessment activities

- 3.40 A range of different types of assessment activities are used in the countries examined as part of this rapid evidence assessment. These include:
- essay writing
 - listening comprehension
 - language comprehension
 - oral examinations
 - project work.

- 3.41 Table 4 shows, however, that in the national standardised assessments listed, the methods of assessment are largely based around multiple choice and constructed response (open ended) test questions.
- 3.42 The Year 6 exams (age 11) in Singapore in English and home languages include four components – two written essays of at least 150 words, listening comprehension, language comprehension (reading), and an oral exam. The oral exam requires students to engage in a conversation on a set topic for 15 minutes, observed by two examiners who grade their oral proficiency. In mathematics, students have to demonstrate the steps in solving a problem (Darling-Hammond, 2010).
- 3.43 In Singapore national exams at age 16 include short and long open-ended responses, multiple-choice items and school-based assessment including research projects and laboratory investigations (Darling-Hammond, 2010).
- 3.44 Internationally, Darling-Hammond (2010) reports a growing emphasis on ‘project-based, inquiry-oriented learning’ which has led to increasing prominence for school-based tasks in state and national systems, including research projects, use of technology to access information and activities to support solving problems, developing products, and presentations about these activities. She goes on to note that ‘these assessments, often incorporated into examination scores, influence the day-to-day work of teaching and learning, focusing it on the development of higher-order skills and use of knowledge to solve problems.’ (p. 5, Darling-Hammond, 2010).

When is it assessed?

Timing of assessments

- 3.45 In general and as Table 4 shows, successful systems conduct national standardised assessments at the end of the primary phase and when the compulsory phase of secondary education comes to an end. This is true of all high performing countries except Finland. As shown in Table 4, Singapore and some Canadian provinces also administer standardised tests at earlier ages, and New Zealand has a test intended to monitor the system at the national level, where the focus of the assessment is to judge the performance of the system rather than of each individual student.
- 3.46 In Finland, student assessment takes place in three settings: within classroom practices, as the final comprehensive assessment of student progress at the culmination of basic education (at age 16), and during the matriculation examination to serve as a criterion for college admission (at age 19) (Hendrickson, 2012).
- 3.47 Although there is no national examination on completion of lower secondary phase education in Korea, students need to take an entrance exam for entry to some senior high schools (age 15+). Based on this, students who have been identified as being particularly gifted are likely to be selected for the appropriate specialist senior high school (specialising in, for example, foreign language, science, art or athletics). Most students usually move up to the next grade level, regardless of their results in the national assessment of educational achievement or continuous assessment.
- 3.48 In New Zealand assessment is used in a more formative way until learners reach the upper secondary schools, when more summative methods are used which provide the basis for the information provided to employers and tertiary education institutions (OECD, 2011).

Use of continuous and 'high-stakes' assessment methods

- 3.49 There is a growing focus in high performing countries on continuous, formative assessment rather than 'high-stakes'²¹ testing although, as noted in the previous section, this still occurs in most of the chosen countries, normally at the end of compulsory education as it provides an objective measure of standards and supports the development of a shared understanding of those standards among practitioners.
- 3.50 Parsons and Beauchamp (2012) argue that 'since learning is complex, using a single measure to assess what has been learned is less than insightful.' They consider that a balanced assessment system is therefore crucial to understand whether a student benefits from instruction and what changes might be needed to enhance that student's learning.
- 3.51 Looney (2009) highlights several concerns surrounding the use of high-stakes testing specifically. For example, she notes concerns that this type of assessment can undermine innovation, and can result in 'teaching to the test'. At the same time, there are concerns that high-stakes tests can promote student anxiety, particularly amongst underachieving students, which can further undermine motivation and engagement.
- 3.52 In Canada, students are regularly tested, but the exams are not high stakes. The Pan-Canadian Assessment Program is intended to inform policy and provision at the jurisdiction level (for territories/provinces), and "low performance does not have to be answered for at state level" (Schmidt *et al.*, 2009). This means that local solutions have to be sought as appropriate.
- 3.53 Finnish students do not take a national, standardised high-stakes test until they matriculate from secondary school at the age of 19 and then only if they intend to enter higher education. Instead, the purpose of assessment in Finland is to improve learning; it is 'encouraging and supportive by nature.' (Hendrickson,

²¹ The results of a 'high stakes' test usually have a significant impact on the test taker (for example tests which determine learners' secondary schools or university entrance).

2012, p. 34). However, the final assessment in Finnish comprehensive schools (at age 16) can also be considered 'high-stakes', as it determines whether students earn a certificate of completion and can continue to general or vocational upper secondary education. The assessments are determined by schools and are aligned with assessment criteria in order for them to be nationally comparable.

3.54 In Korea, all students who wish to go on to tertiary education (such as university) after completing their high school education have to take the College Scholastic Ability Test (CSAT) involving a written test in the core subject areas. Early each year, institutions announce their student admission criteria and the relative weights assigned to the various elements such as CSAT score, high school records, institution's own examinations, interviews, essays and recommendation letters. The CSAT is currently being revised (applicable from 2014) to reduce the pressure on students taking the test.

3.55 In New Zealand students can accumulate credit towards their National Certificate of Educational Achievement (NCEA) qualification over a number of years. They do not, for example, have to achieve all the credits for a level 1 certificate while in Year 11 (the final year of compulsory secondary education, aged 15-16), although it is expected that reasonably able students should be able to do so (DfE, 2011).

How assessment interacts with the curriculum

Assessment and curricular innovation

3.56 As noted previously, while the testing of skills in individual curriculum areas, notably literacy and numeracy, is a common feature of successful education systems, those countries which perform well have also recognised the need to move away from a demarcated system of subject assessment and have sought ways of developing a system for assessing how learners apply their knowledge and use it intelligently for problem solving and in real life situations.

3.57 As Looney (2009) notes, this has clear implications for the way learners are taught given that ‘tests that measure student’s understanding of inter-connections and patterns will provide more opportunities for teachers introduce use [*sic*] innovative strategies in the classroom’ (p. 22) and argues that ‘the use of multiple measures²² of student and school performance may also relieve some of the pressure of high-stakes assessments, and also ensure that data are valid and reliable’ (p. 22).

3.58 Looney (2009) proposes three main ways of supporting innovation in assessment:

- developing a wide range of performance measurements for both students and schools
- re-thinking the ways in which standards are aligned with assessment (see next section below), and
- measuring the impact of assessments on teaching and learning.

Ensuring practitioner capacity

3.59 The high performing systems identified have placed a strong focus on ensuring teachers are skilled in assessment work. Teachers in Finland have high levels of assessment literacy and there is increasing interest in these skills within the international assessment community.

3.60 Darling-Hammond (2010) outlines that the emphasis on school-based performance assessments in many countries appears to ‘strengthen teaching where teachers learn more deeply about how to enact standards by participating in scoring and/or reviewing student work.’ She notes that these assessments – long the norm in countries such as Finland – are becoming increasingly important parts of the assessment systems in jurisdictions like Singapore and England. She also considers that this process may ‘also increase curriculum equity, as all students engage in more common activities and instructional supports as part of the required assessments.’

²² Using different types of assessment at different times to provide a broader picture of a student’s abilities and needs.

- 3.61 Darling-Hammond (2010) outlines that managing assessment in a way that develops classroom practice has often been an important way of managing an integrated curriculum, teaching, learning, and assessment system in smaller countries. She goes on to note that this approach has enabled strong teacher participation in the assessment process in such countries and allows curriculum-embedded assessments to be moderated to ensure consistency in scoring. She adds that smaller nations have been able to support such integrated systems because of their more manageable size. This has been accompanied by a recognition of the need to ensure practitioners are equipped with the skills of assessment through initial and on-going professional development opportunities and that they are given support to enable them to do so effectively.
- 3.62 In New Zealand, a set of nationally validated assessment tools are available for teachers to guide assessment practice, and professional learning opportunities are provided through initial training and in-service training (Nusche *et al.*, 2011).
- 3.63 The need to nurture practitioner capacity has also been linked to the development of an infrastructure to support teachers to conduct school-based assessment in New Zealand. The ministry of education has developed an extensive website for teachers that provides them with information on assessment for the classroom and assessment standards, including student exemplars that illustrate student learning and achievement in answer to the question, “What is quality work?” (Parsons and Beauchamp, 2012).
- 3.64 Developing teacher capacity is crucial for a number of reasons. High performing countries, especially Finland, have invested considerable time developing and maintaining a shared understanding of standards among practitioners across the country. This is an area the Welsh government will have to consider carefully. An initial survey of teachers, focus groups or case studies may yield valuable information to inform planning for future teacher development.

How assessment impacts on standards

3.65 There is little direct evidence about the relationship between assessment arrangements and the systems' performance of the countries chosen for the review. During the review, the literature was examined from two distinct angles:

- the extent to which assessment data can be used as a way of monitoring and controlling performance
- the contribution of assessment evidence to effective teaching and learning.

Monitoring and control

3.66 While some high performing countries have adopted a system of rigorous public accountability (characterised by league tables and a competitive ethos) others rely much more heavily on the role of professional practitioners in collecting, interpreting and using the assessment data to promote learners' development and achievement.

3.67 In Singapore, the ministry of education uses the test results of continuous formative assessment to evaluate school performance. League tables are published and the assessment results also form a part of a School Excellence Model (SEM) which is a quality assurance system. Schools assess themselves using SEM and every five years there is an external audit of the data provided by schools (Schmidt *et al.*, 2009). All other assessments are school-based and include coursework, research projects and investigations (Darling-Hammond, 2010).

3.68 In Korea, the National Assessment of Educational Achievement was originally intended to provide results at a national level which could be used for monitoring the education system. Now, results are also provided at regional, district and school and pupil level. There was resistance to this move from teachers and teaching unions because of the consequences that were envisaged due to a focus on exam results (Kim *et al.*, 2012).

3.69 The OECD review of evaluation and assessment found that New Zealand has developed its own distinctive model of evaluation and assessment that is characterised by a high level of trust in schools and school professionals (Nusche *et al.*, 2011). This approach relies on national standard setting combined with strong school autonomy in implementing evaluation and assessment (Nusche *et al.*, 2011).

Using assessment to promote learning

3.70 Assessment information is used for a wide range of purposes. Summative assessment gives a snapshot of performance, usually at the end of a phase or stage of schooling and is often used for accountability purposes as well as to differentiate and group learners. Formative assessment, or Assessment for Learning, uses assessment information as a means of informing teaching and learning. In high performing countries assessment is used as a tool for learning; there is an emphasis on formative as well as summative assessment as a means of identifying learners' strengths and needs.

3.71 Several countries have policies promoting the use of formative assessment; 'the frequent, interactive assessment of student understanding and progress to identify learning needs and adapt teaching' (Looney, 2009, p. 6). This is used as a way to build students' skills for self-assessment and learning-to-learn, and to raise levels of achievement, particularly for low performing students. Such policies are seen in Canada, Finland and New Zealand.

3.72 Looney (2009) explains that assessment is increasingly seen as a way to 'identify gaps in student learning and to adapt to teaching appropriately. This fits with the national policies in several OECD countries, where 'lifelong learning' is promoted, for example, through the development of key competencies in their national curriculum.

3.73 Similarly, Darling-Hammond (2010) outlines the growing move in many countries including Finland, Singapore and New Zealand to promote assessment of, for and as learning, rather than seeing testing as a separate

disjointed element. She goes on to consider that this approach ‘may provide opportunities for strengthening the teaching and learning of 21st century skills, as well as their assessment.’

- 3.74 The Nusche *et al.*, 2011 review identifies a key strength of the New Zealand education system as the way in which assessment is designed to improve learning; ‘assessment for learning, or formative assessment, is at the heart of New Zealand’s assessment strategy’ (p. 42).
- 3.75 Likewise, Hendrickson (2012) reports that, in Finland, annual assessments, based on a wide range of student work, provide feedback to students about progress in learning and suggestions for improvement. There, normative assessment takes place in early primary school to identify students with possible learning disabilities and need for special education support. Supportive, positive feedback is used to increase student learning and feelings of self-efficacy. Student growth and progress are carefully monitored and shared with students and parents to encourage further student growth and study habits, as well as the development of self-evaluation skills.
- 3.76 According to the Finnish National Board of Education the main purpose of assessing students is to guide and encourage students’ own reflection and self-assessment. Consequently, on-going feedback from the teacher is very important. Teachers give students formative and summative reports both through verbal feedback and on a numerical scale based on students’ level of performance in relation to the objectives of the curriculum. Teachers’ reports must be based on multiple forms of assessment, not only exams.
- 3.77 Parsons and Beauchamp (2012) consider that to achieve alignment, a comprehensive and coherent assessment system needs to find balance between different formative and summative assessments (e.g., standardised, classroom) to meet diverse learning needs and to ascertain that the learning outcomes have been achieved. They conclude therefore that establishing linkages between standardised assessments and classroom assessments and aligning them with the achievement of learning outcomes is ‘desirable’.

4 The evidence in the Welsh context

4.1 This rapid evidence review examined the impact of curriculum and assessment arrangements within high performing PISA countries. Its specific objectives were to 'synthesise the evidence found, highlighting key findings and key themes in the evidence' and to 'summarise the implications for policy and practice' in order to identify the gaps in the evidence base and provide suggestions for future educational research to address those gaps. This was to be undertaken through analysis of:

- the core curricula (English/national language, mathematics, science) across ages 8-14, including the extent of literacy and numeracy coverage
- the flexibility around the non-core subjects that are taught
- the timing of assessment
- the relationship between curriculum content and assessment regime
- the nature and practice of assessment including the balance between formative and summative assessment and between internal and external assessment.

4.2 There is a need to exercise great care when examining evidence from other countries about 'what works' in relation to any aspect of public policy, especially an area such as education which is influenced by a range of social, economic, cultural and political factors. This was recognised explicitly in the specification which acknowledged that 'issues of culture, teaching practice, status of schooling in society and parental influence' affected these aims and that 'a thorough investigation of all the factors that impact on a nation's performance in international tests would be a lengthy and complex enquiry'. Therefore the rapid evidence review was intended to 'provide a focussed investigation of how different aspects of the curriculum and assessment system are developed and controlled in high performing countries' in order to facilitate policy learning.

4.3 Within these limitations, however, some key messages emerge that may influence discussions in Wales about the ongoing development of the curriculum and how it is assessed.

The school curriculum

The core and non-core curriculum

4.4 The curriculum pursued by learners aged 8-14 in Wales is not dissimilar to that studied by their counterparts in high performing countries. In each one, literacy in first language²³ and numeracy are at the heart of the curriculum. These skills are developed through formal study of first language (L1) and mathematics alongside the type of subjects which have comprised the National Curriculum in Wales since 1988 and reviewed subsequently. They include science, social studies (including humanities, history, geography etc), arts, technology and in some cases foreign languages and various non-statutory options. What is not clear, however, is the emphasis which is placed on different subjects and the amount of time allocated to them overall and at different stages during the experience of a learner aged 8-14.

4.5 The evidence does not suggest that high performing systems have reduced the curriculum load by increasing flexibility around the non-core subjects that are taught in order to enable schools to focus on the core elements of the curriculum. Therefore, it is not possible, on the basis of this evidence review, to argue that reducing the number of subjects a learner is required to study between the ages of 8-14 will contribute to improved outcomes in the core subjects. Instead, the evidence suggests that success has been evident where literacy and numeracy have been embedded and where there has been a focus on skills and competencies; issues that are discussed below.

²³ Canada, Finland, New Zealand and Singapore have more than one national language. In New Zealand, the language of instruction is English in the majority of cases. In Finland and Alberta, Canada, the first language will depend on the language of instruction of the school (e.g. Finnish or Swedish; and English or French, respectively) with study of the other national languages also included in the curriculum.

Focus on literacy and numeracy

- 4.6 The need to embed literacy and numeracy through cross-curricular approaches was emphasised in *Making the most of learning* (DCELLS, 2008). In addition, both the Welsh Government's *Improving Schools* strategy and the focus of the Minister for Education and Skills' 20 Point Action Plan reiterate the fundamental importance of literacy and numeracy within all teaching and learning. A specific requirement is that enabling children to acquire and develop these skills is the responsibility of all teachers. Likewise, the *Rapid Assessment on 'What Works' for Numeracy Teaching* (Welsh Government, 2012) highlights the need to embed numeracy across the curriculum and to emphasise those skills in all subjects rather than solely in mathematics. This is an approach which is widely used in other countries. The Welsh Government's 20 Point Action Plan refers to the need to ensure that literacy and numeracy is at the heart of all teachers' work. The Action Plan includes a commitment to ensuring consistency in standards and in the expectations of teachers and it is reflected in its priorities for initial teacher training, the requirements of the Practising Teacher Standards (PTS), and in their priorities for on-going professional development.
- 4.7 This clearly accords with work in high performing systems which are underpinned by a culture which places these skills at the heart of the curriculum and what is assessed. The practice identified in other countries was that literacy and numeracy are embedded across the curriculum as part of the defined competencies which the education systems are expected to address not only in the specific subjects of mathematics and L1 but as a cross-curricular theme. The development and introduction of the National Literacy and Numeracy Programmes can thus be seen as essential elements of ensuring that literacy and numeracy will be effectively taught and learned and embedded across the curriculum.
- 4.8 This review did not identify specific examples where numeracy was assessed formally as part of other subjects. It was assessed where learners were expected to display their understanding, thinking skills and problem-solving skills but the evidence seen did not suggest that numeracy assessments were

situated in subjects such as geography, history, physical education, for example. Similarly, there was a lack of specific evidence relating to how literacy is integrated into the curriculum and assessed. Further research is required to identify exactly how and to what extent literacy and numeracy are addressed across the curriculum as a whole in high performing systems.

The skills curriculum

4.9 The evidence suggests that in addition to embedding literacy and numeracy across the curriculum as a whole, successful systems are moving towards an emphasis on complex, higher-order skills. This increasingly emphasises features such as creativity, encouraging children to apply their knowledge and use analytical skills and develop critical thinking, solve problems, select information, apply knowledge and draw conclusions. This approach is evident in the *Skills Framework for 3-19 Year Olds in Wales* (DCELLS, 2008) with its emphasis on the skills of thinking, communication, number and ICT. The ethos and content of the *Skills Framework* through its focus on aspects such as problem solving, creative and critical thinking, selecting information, and applying knowledge and drawing conclusions resonates with the approach adopted in the high performing countries examined.

4.10 Again, however, there is a need to examine issues such as:

- how the *Skills Framework* is being addressed by schools in Wales
- the extent to which the *Skills Framework* has potential as a measure of quality assurance for pupil progression (a point highlighted by the Review of the Structure of Education Services in Wales (DCELLS, 2011) which noted that '*It is disappointing that the skills framework was not made statutory*' (DCELLS, 2011, p.37)
- how practitioners have been supported to address the *Skills Framework* and to embed it in their work
- how the skills-based curriculum which has been developed in Wales compares with those which has been introduced in high performing systems

(e.g. how skills feature in different learning activities, what skills feature in different learning activities, how skills are embedded).

Reviewing the curriculum

4.11 In many of the high performing countries curriculum content has been reviewed periodically (driven by a range of factors including performance of the education system, political and economic factors). The practice is embedded in countries such as Korea (which has a system of formal curriculum reviews), and is also evident in countries which allow varying degrees of autonomy to schools in these matters (such as Finland and New Zealand). These are usually led at the state level but involve a much broader range of stakeholders, including the research and academic community and practitioners.

4.12 Similar work has been undertaken in Wales. The review undertaken by ACCAC²⁴ in 1997-99 led to the revised Curriculum 2000 and subsequent work in 2006-07 led to Curriculum 2008. The emphasis on skills and competencies which has underpinned the approach adopted in Wales is mirrored in several high performing countries where curriculum reviews have led education policy to move in a similar direction to that of Wales.

Assessment arrangements

When does assessment take place?

4.13 Literacy and numeracy are assessed by national standardised assessments across the high performing systems examined in this review. Where learners aged 8-14 are assessed, this is usually done on a standardised basis at the end of the primary phase around age 11.

The methods of assessing

²⁴ Awdurdod Cymwysterau Cwricwlwm ac Asesu Cymru / Qualifications, Curriculum and Assessment Authority for Wales

- 4.14 There are different arrangements in place for assessing learners aged 8-14. In the high performing systems examined the use of standardised tests forms part of a framework of broader assessment activities. These include continuous, classroom-based work; project work and the use of ICT as a vehicle for conducting assessments.
- 4.15 Four out of the five countries examined use standardised tests as well as international surveys, to monitor their education systems. These are used to promote educational attainment, as is done in Finland in particular, where assessment information is used to address, and reduce, underachievement.
- 4.16 The extent to which there is independent oversight of assessments varies. Some countries externally validate the whole cohort while others do so on the basis of a sample. There is some evidence that at least a sample of learners' assessments are verified through an external assessment in several high performing countries.
- 4.17 The degree to which high-stakes tests are used, varies as does the use which is made of the assessment data. In most high performing countries the evidence from the assessments is used to inform ongoing teaching and learning as well as to monitor and report on progress (to parents, schools and governments).
- 4.18 The Assessment Review Group (2004) envisaged a system in Wales based on Teacher Assessment in English/Welsh first language, mathematics and science that:
- was underpinned by robust moderation arrangements
 - required secondary schools to gain accredited centre status
 - included a diagnostic skills test to be introduced in Year 5.
- 4.19 As was made clear in the Review of the Structure of Education Services in Wales (DCELLS, 2011) the methods of assessing that were introduced in Wales in response to the Review Group's recommendations differ in important respects from what the Assessment Review Group envisaged. Moreover, this

rapid evidence review suggests that because of this, the system which has developed in Wales since the Assessment Review differs in important respects from practice in high performing countries which include the use of standardised tests that are implemented using a form of external verification.

4.20 The decision to introduce the standardised assessments that are to be used in Wales from 2013 which all pupils in years 2-9 are required to undertake will mean that the arrangements in Wales will be more like those used in high performing systems. The tests planned for Wales from 2013 will provide valuable data for teachers, and individual students, in every year group from 2 to 9 (ages 6 to 14). They will also serve an important role in developing an understanding of standards and expectations.

4.21 However, other elements will also need to be present in order for the assessment arrangements in Wales to reflect those used in high performing countries. In particular, the need to support practitioners to ensure they are able to maximise the use of assessment is a strong theme in the literature. Such work, the literature suggests, needs to encompass the skill of assessment (what to assess, when to assess, how to assess) and also the use of assessment. The way the education system supports and challenges practitioners is, therefore, of vital importance in developing effective curriculum and assessment arrangements.

4.22 At the same time this rapid review found that in high performing systems assessment data is used for summative purposes (monitoring, accountability and reporting) and for formative ones (identifying learning needs, tailoring teaching and learning approaches, and ensuring that pedagogical approaches meet the needs of the individual child). In many of those countries this is emphasised in initial teacher training and through subsequent in-service opportunities. A challenge for the education system in Wales, therefore, is to ensure that such issues are addressed when practitioners undergo their initial training and that they are supported to do so throughout their career.

Harnessing professional expertise

- 4.23 There is evidence that practitioners are involved in assessment processes in small countries which have been able to use the closeness of national government to work on the ground to develop an inclusive approach that maximises the potential of staff. As Looney notes, in the systems which she examined ‘the focus is on providing teachers with more opportunities for professional development, as well as guidelines and tools’ (Looney, 2009, p.14) and this again links to opportunities outlined in *Improving Schools* such as the Masters in Educational Practice qualification.
- 4.24 At the same time, the development of skills for assessment is usually rooted in a broader culture of professional interest and inquiry among practitioners. This has been nurtured effectively across high performing countries, especially in Finland. The emphasis on supporting practitioners to reflect on practice and use action research as part of a culture that strives for improvement is something that is alluded to in the evidence gathered as part of this review. This can also be linked to a focus on leadership and taking the initiative which is encouraged at a practitioner level in several of the reviewed countries and, again, is a key focus for *Improving Schools*.
- 4.25 The evidence gathered as part of this REA suggests that Wales, because of its size and the number of schools within the system, is well-placed to develop an approach to curriculum and assessment that harnesses practitioners’ expertise, in a way similar to the practice identified by Looney (2009). However, further research is required before firm conclusions can be drawn and it is clear that a stronger mechanism needs to be in place to support practitioners, and to identify and share good practice. It is recognised however that as part of the overarching review of curriculum the Welsh Government has commissioned research into practitioner support and expertise. The findings of that report were not available for consideration as part of this REA however but any pertinent findings should be borne in mind for the future.

Education in its social context

4.26 The need to ensure that all learners are supported is a central theme in the *Improving Schools* strategy. It places considerable emphasis on specific areas such as the responsibility of the education system in Wales to enable learners in receipt of free school meals to fulfil their potential. It also identifies school attendance as a central priority. This review was not tasked with examining how the high performing systems that were examined had addressed those specific issues.

4.27 From the evidence gathered as part of this rapid review it does not appear that those considerations have influenced the design of the curriculum nor the assessment arrangements used in the high performing systems studied. Further research is therefore required before conclusions can be drawn about the extent to which high performing systems have addressed questions such as how to ensure children and young people attend school, how they can be inspired and motivated, and what specific measures are required to support those from the economically disadvantaged backgrounds.

Systems' journeys

4.28 Each of the high performing systems has started the journey of evolving its education policy from different standpoints. The literature included in this rapid review does not allow for a comprehensive view of the history of educational policy in the five countries and how developments have been influenced by social, economic, political and cultural considerations.

4.29 Some themes do, however, emerge from the literature. The emphasis on higher-order thinking skills, creativity, and relating what goes on in the classroom to the world outside has been a feature of the way education policy has evolved in successful countries for ten to fifteen years. The literature notes, for example, that in Singapore such reforms were introduced in 1997-2002. New Zealand introduced important changes to its assessment arrangements before 2003 (developing different routes of accrediting learning and emphasising the need to recognise achievement rather than failure), and its

emphasis on numeracy was in part influenced by concerns about performance in that area evident from the late-1990s. New Zealand was also, prior to 2003, concerned about 'systematic underachievement in education' (Looney, 2009, p.15). Similarly, the Canadian educational journey has been characterised by a move from rigidity to child-centred, liberal methods in the 1960s and 1970s which were reassessed in the 1980s as has been discussed earlier in this report.

Trends in Performance in PISA

4.30 In terms of the journey towards high performance, it should be noted that none of the countries studied here started out with scores below the international average in PISA. Indeed all tended to be significantly above the international average score from their first involvement in the survey (see, for example, OECD & UNESCO, 2001; OECD, 2004; OECD, 2007; OECD, 2010). In contrast, students in Wales have achieved a national average below the international mean in all subject areas (except in scientific literacy in 2006) (Bradshaw *et al.* (2007), Bradshaw *et al.* (2010).

5 Discussion

- 5.1 The purpose of this review was not to identify ‘the correct’ approach to curriculum and assessment arrangements; every country, province, territory etc will have its unique set of educational policy, social, cultural and historical background factors. The interactions between such factors necessarily mean that it is essential that policy makers take account of their own unique context and tailor their decisions to meet their own specific priorities. It is widely recognised that wholesale ‘policy tourism’ is not an appropriate strategy and that no ‘one size fits all’.
- 5.2 Nonetheless, there can be considerable value in reviewing the curriculum and assessment systems chosen by other countries, particularly high performing countries, to explore whether any common patterns emerge and to examine any evidence of their impact. This was the main purpose of this rapid evidence assessment.
- 5.3 A key factor commonly identified in high performing countries is a recognised an underlying cultural ethos whereby education is highly valued (OECD, 2011).

Emerging patterns of good practice

- 5.4 A number of commonalities have been identified across the high performing countries examined. These include:
- regular review of arrangements and awareness of evidence from around the world
 - sharing clearly specified, finely grained assessment criteria
 - the use of standardised tests to support understanding and maintain consistency of standards
 - effective monitoring and evaluation
 - strong investment in developing the quality of teachers’ skills.
- 5.5 However, there were also a number of differences between countries which also serve to raise questions and promote further discussion within the Welsh

Government as they prioritise and plan the next stage of their educational journey.

Assessment models

- 5.6 Each of the countries examined conducts a range of assessments throughout the primary and early secondary phases. Regular monitoring of student achievement is fundamental to reflective practice, teaching and learning and assessment data can be used effectively to inform policy and practice. The specific nature of the assessments chosen, whether external test or teacher assessment, may be determined by the specific purposes for which the information is to be used. External, standardised summative assessment is often regarded as the most robust form of assessment for system-wide monitoring, whereas a substantial proportion of the educational community advocate teacher assessment (summative and formative) as the most valid form of assessment to inform learning and develop pedagogy.
- 5.7 Internationally, there has been a noticeable pattern of reversals in the assessment arrangements in a number of high profile countries. Australia and Sweden for example have, for decades, famously pioneered the use of summative teacher assessments – but have, relatively recently re-introduced national testing at intervals throughout compulsory education. Alternatively, other countries where strict formal testing routines have been well established are tending towards an approach that focuses on teacher professional development. It seems likely that the specific approach to assessment may be of less importance than achieving an appropriate balance and ensuring that the results are analysed appropriately and used to feedback and inform and develop what happens in the classroom.
- 5.8 External tests are of value in providing an objective, comparable measure. They also play a crucial role in ensuring a reliable, shared understanding of standards.

5.9 The use of tests themselves, however, does not ensure best practice, or progress, within the classroom. It is important that the results of the tests be analysed within a culture of reflective practice at both policy and at school levels.

5.10 Some assessment questions the Welsh Government may wish to consider moving forward:

- Does our assessment programme provide a coherent/integrated part of the whole data system on education in Wales?
- Are our assessments conducted at appropriate critical points for students?
- Does our assessment data allow for the possibility of tracking cohorts and of students?
- How useful is our assessment data for informing learning processes, teaching, curricula and classrooms?
- How useful is our assessment data for providing research evidence and informing policy?
- How can our current assessments be used formatively to support learning?

Assessments should provide a window on performance in a contextual and comparative way. Contextual, so that performance can be viewed in relation to factors beyond education policy and comparative so that differences between groups of children, cohorts, schools, regions and countries can be used to inform teaching and learning as well as policy and intervention.

Curriculum development, revisions and consultations

5.11 The Welsh Government has, over several years, already introduced a number of curriculum and assessment policy changes that correspond with the current good practice identified in this review, as noted above. On a regular basis, curriculum and assessment arrangements have been widely consulted on and updated. The international trend towards skills based curricula has been incorporated within a structured literacy and numeracy framework. Learning within cross-curricular/interdisciplinary contexts has been widely promoted, and

a number of high quality support and guidance materials have been produced and made available to schools and overarching themes and competencies have been integrated.

5.12 However, what is less clear is the extent to which the various revisions, initiatives and interventions have been monitored and evaluated. When any new programme is introduced it is important that both process and impact are examined – ideally with sensitive and robust evaluation measures in place from the outset to ensure reliable evidenced baselines.

5.13 One major initiative, for example, was the *Developing thinking skills and assessment for learning*. The Estyn evaluation of the programme (2011a) indicated that although the teaching and learning techniques were recognised as good practice

‘the need to apply the programme’s techniques within an overall curriculum plan that is designed to develop pupils’ skills progressively has not generally been well understood.’

(p.1)

5.14 Pockets of excellent practice had been observed, but there was considerable variation and inconsistency, particularly in secondary schools (Estyn, 2011a).

5.15 One further element worthy of consideration is the extent to which teaching and learning, engagement, and the development of 21st century skills can be promoted and supported through the effective use of technology. This may imply changes to the curriculum and teacher development based on research evidence.

Reducing under achievement

5.16 A number of international studies examine the distribution of student achievement within countries. The OECD study of 2011 has identified that a

number of high performing countries have successfully reduced the long tail of underachievement that is common in countries that perform less well.

5.17 Finland, in particular, has long had a firm policy to prioritise early intervention specifically targeted at diminishing underachievement across the board.

Practitioner development

5.18 The evidence suggests that high performing countries have recognised that developing teacher professionalism, and mutual trust, lies at the heart of effective teaching and learning.

5.19 Managing changes to mindset and pedagogy is neither easy nor fast. Nonetheless, careful and creative investments in teacher learning have the potential to make both qualitative and quantitative impacts on student learning. Consideration should be given to a range of teacher development approaches from direct training to peer coaching and the development of teacher learning communities to explore and develop good practice.

5.20 Strong leadership, whole-school policies and practitioner development and engagement are all recognised factors in successful policy implementation.

5.21 Ensuring opportunities for practitioner reflection in the context of sharing of good practice, experience and planning both within and between schools are all likely to accelerate the successful embedding of good principles and practice as identified by the research evidence.

6 Appendix 1 Methodology and approach

Rapid evidence assessment

6.1 The methodology of this rapid evidence assessment involved systematic searching and a consistent, best evidence approach to the selection of literature. The aim was to use the most appropriate available evidence to produce the findings.

Identifying literature

6.2 A comprehensive search strategy was developed, based on the indicative list supplied in the invitation to tender of search terms supplemented with keywords from the controlled vocabularies of relevant databases. The search strategy involved using four different types of search sources to ensure thorough coverage of the evidence base:

6.3

- A range of general bibliographic databases providing international coverage of education and the social sciences, including Australian Education Index (AEI), British Education Index (BEI), Education Resources Information Center (ERIC) and IDOX Information Service (a database of policy documents, policy analysis and research in all areas of public sector policy and practice);
- Websites of the education ministries and key educational research organisations in Canada (Alberta), Finland, New Zealand, Singapore and South Korea;
- Websites of other key organisations, including the International Association for Educational Assessment (IAEA), Organisation for Economic Cooperation and Development (OECD), UNESCO including the International Bureau of Education, and the World Bank;
- International contacts and knowledge within NFER to provide details of, and the policy context for, key curriculum standards and assessment practices in the five high performing countries.

Selecting and appraising the literature

6.4 A four stage process was used to filter the search results, so that only the most relevant and best quality studies were included within the review. The four stages were: i) screening; ii) coding; iii) appraising; and iv) synthesising. These are explained below.

i) Screening the literature

6.5 The review team screened all sources identified by the searches, based on a thorough analysis of the abstracts provided for each item, seeking to exclude all sources that did not meet the inclusion criteria. The literature met the following parameters in order to be included in the review:

Publication date:	Work published from the year 2000 onwards
Geographical scope:	Canada, Finland, Korea, New Zealand and Singapore
Language:	Published in English
Study type:	Published literature, research studies and government policy documents
Study topic:	<ul style="list-style-type: none">• analysis of the core curricula (English/national language, mathematics, science) across ages 8-14, including the extent of literacy and numeracy coverage, flexibility about the teaching of non-core subjects, and when assessment takes place• the relationship between curriculum content and assessment regime• the nature and practice of assessment including the balance between formative and summative assessment and between internal and external assessment.

ii) Coding the literature

6.6 Once the screening process was complete a coding frame was developed to help further assess the literature:

Screening criteria

1. Range: from 2000-2013
2. Item focuses on curriculum and/or assessment with a particular focus on impact and is transferable to the Welsh context
3. Item pertains to one or more of the study jurisdictions: Canada, Finland, Korea, New Zealand and Singapore
4. Based on quantitative evidence
5. Based on qualitative evidence
6. Speculative

Coding criteria

- If item meets criteria 1 AND 2 AND 3 AND (4 OR 5) – **mark as an a**
- If item meets criteria 1 AND 2 AND 3 AND 6 – **mark as a b**
- If there is uncertainty about relevance – **mark as a c**
- If item is irrelevant on the basis of above screening criteria – **mark as an x**

6.7 The review team coded all studies that meet the inclusion criteria, using the coding frame, on the basis of abstracts. On the basis of the coding, twenty of the most relevant and best quality items were appraised and eighteen synthesized.

iii) Appraising the literature

6.8 The appraisal of literature took into consideration:

- the items of greatest relevance to the review questions;
- distinctions between different kinds of evidence, such as: quantitative evidence and qualitative evidence; well-established trends and emerging findings;
- the validity or trustworthiness of individual studies' findings according to a range of criteria, including the research design, sample size, methods of data collection and data analysis, theoretical approach, and relationship between claims made and evidence presented.

6.9 In order to ensure a systematic approach to the appraisal of all literature sources, the research team used the Data Audit Form provided in the invitation to tender to extract the key research question(s) and findings from each study, as well as assessing the strength of the evidence base and the quality of each item.

iv) [Synthesising the literature](#)

6.10 Having appraised the key literature items, NFER and ARAD researchers synthesised the findings to draw out emerging themes, patterns and key messages based on the outlined study topics and ensure they are transferable to the Welsh context.

7 Appendix 2 Search strategy in detail

7.1 This section provides information on the precise search strategies used with each of the bibliographic databases in terms of the keywords used and also their combination. All searches were limited to publication years 2000-2012, in English language only. Throughout, the abbreviation 'ft' denotes that a free-text search term was used, * denotes the truncation of a term and \$ denotes the use of a wildcard.

Databases

7.2 The following databases were searched.

Source	Items selected for consideration
Australian Education Index (BEI)	23
British Education Index (BEI)	39
Education Resources Information Center (ERIC)	78
IDOX	18

Australian Education Index (AEI)

7.3 AEI is Australia's largest source of education information covering reports, books, journal articles, online resources, conference papers and book chapters.

Set 1 Curriculum

#1	Curriculum	#9	Outcomes (ft)
#2	National Curriculum	#10	Purpose (ft)
#3	#1 OR #2	#11	Skills (ft)
		#12	Statutory requirements (ft)
#4	Breadth (ft)	#13	Structure (ft)
#5	Depth (ft)	#14	English (ft)
#6	Content (ft)	#15	Mathematics (ft)
#7	Impact (ft)	#16	Science (ft)
#8	Inclusion (ft)	#17	National language (ft)

- | | | | |
|-----|--|-----|--|
| #18 | Home language (ft) | #24 | Curriculum evaluation |
| #19 | #4 OR #5 OR #6 OR #7 OR #8
OR #9 OR #10 OR #11 OR #12
OR #13 OR #14 OR #15 OR
#16 OR #17 OR #18 | #25 | Curriculum improvement (ft) |
| #20 | #3 and #19 | #26 | Curriculum innovation (ft) |
| #21 | Curriculum content (ft) | #27 | Curriculum reform (ft) |
| #22 | Curriculum design | #28 | Curriculum reorganisation (ft) |
| #23 | Curriculum development | #29 | #21 OR #22 OR #23 OR #24
OR #25 OR #26 OR #27 |
| | | #30 | #20 OR #29 |

Set 2 Assessment

- | | | | |
|-----|---|-----|--|
| #31 | Assessment | #42 | Assessment for learning (ft) |
| #32 | Accountability | #43 | Assessment of learning (ft) |
| #33 | Exemplification (ft) | #44 | Continuous assessment (ft) |
| #34 | Focus (ft) | #45 | Examinations |
| #35 | Method (ft) | #46 | External assessment (ft) |
| #36 | Moderation (ft) | #47 | Formative assessment (ft) |
| #37 | Purpose (ft) | #48 | Internal assessment (ft) |
| #38 | Reliability | #49 | Summative assessment (ft) |
| #39 | Value (ft) | #50 | Teacher assessment (ft) |
| #40 | #32 OR #33 OR #34 OR #35
OR #36 OR #37 OR #38 OR #39 | #51 | #42 OR #43 OR #44 OR #45
OR #46 OR #47 OR # 48 OR #49 OR
#50 |
| #41 | #31 AND #40 | #52 | #41 OR #51 |

Set 3 Curriculum and assessment

- | | | | |
|-----|--------------------------------|-----|-------------------|
| #53 | Curriculum and assessment (ft) | #56 | Links (ft) |
| #54 | Arrangements (ft) | #57 | Reform (ft) |
| #55 | Impact (ft) | #58 | Relationship (ft) |
| | | #59 | Review (ft) |

#60 structure (ft)
#61 #54 OR #55 OR #56 OR #57
OR #58 OR #59 OR #60

#62 #53 AND #61

Set 4 Standards

#63 Curriculum standards (ft)
#64 Educational standards (ft)
#65 Learning outcomes (ft)
#66 National standards

#67 Performance standards (ft)
#68 #63 OR #64 OR #65 OR #66
OR #67

Countries

#69 Canada (ft)
#70 Alberta (ft)
#71 #69 OR #70
#72 Finland (ft)
#73 Korea (ft)
#74 New Zealand (ft)
#75 Singapore (ft)

#76 #71 OR #72 OR #73 OR #74
OR #75
#77 #30 AND #76 (set 1)
#78 #52 AND #76 (set 2)
#79 #62 AND #76 (set 3)
#80 #68 AND #76 (set 4)

British Education Index (BEI)

7.4 BEI provides information on research, policy and practice in education and training in the UK. Sources include over 300 journals, mostly published in the UK, plus other material including reports, series and conference papers.

Set 1 Curriculum

#1 Curriculum
#2 National Curriculum
#3 #1 OR #2
#4 Breadth (ft)
#5 Depth (ft)
#6 Content (ft)
#7 Impact (ft)
#8 Inclusion (ft)
#9 Outcomes (ft)
#10 Purpose (ft)
#11 Skills (ft)
#12 Statutory requirements (ft)
#13 Structure (ft)
#14 English (ft)
#15 Mathematics (ft)
#16 Science (ft)
#17 National language (ft)
#18 Home language (ft)

#19 #4 OR #5 OR #6 OR #7 OR #8
OR #9 OR #10 OR #11 OR #12
OR #13 OR #14 OR #15 OR
#16 OR #17 OR #18
#20 #3 and #19
#21 Curriculum content
#22 Curriculum design
#23 Curriculum development
#24 Curriculum evaluation
#25 Curriculum improvement
#26 Curriculum innovation
#27 Curriculum reform
#28 Curriculum reorganisation
#29 #21 OR #22 OR #23 OR #24
OR #25 OR #26 OR #27
#30 #20 OR #29

Set 2 Assessment

#31	Assessment	#42	Assessment for learning (ft)
#32	Accountability	#43	Assessment of learning (ft)
#33	Exemplification (ft)	#44	Continuous assessment
#34	Focus (ft)	#45	Examinations
#35	Method (ft)	#46	External assessment (ft)
#36	Moderation (ft)	#47	Formative assessment (ft)
#37	Purpose (ft)	#48	Internal assessment
#38	Reliability	#49	Summative assessment
#39	Value (ft)	#50	Teacher assessment
#40	#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39	#51	#42 OR #43 OR #44 OR #45 OR #46 OR #47 OR # 48 OR #49 OR #50
#41	#31 AND #40	#52	#41 OR #51

Set 3 Curriculum and assessment

#53	Curriculum and assessment (ft)	#58	Relationship (ft)
#54	Arrangements (ft)	#59	Review (ft)
#55	Impact (ft)	#60	structure (ft)
#56	Links (ft)	#61	#54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60
#57	Reform (ft)	#62	#53 AND #61

Set 4 Standards

#63	Curriculum standards (ft)	#67	Performance standards (ft)
#64	Educational standards (ft)	#68	#63 OR #64 OR #65 OR #66 OR #67
#65	Learning outcomes (ft)		
#66	National standards (ft)		

Countries

#69	Canada (ft)	#76	#71 OR #72 OR #73 OR #74 OR #75
#70	Alberta (ft)		
#71	#69 OR #70		
#72	Finland (ft)	#77	#30 AND #76 (set 1)
#73	Korea (ft)	#78	#52 AND #76 (set 2)
#74	New Zealand (ft)	#79	#62 AND #76 (set 3)
#75	Singapore (ft)	#80	#68 AND #76 (set 4)

Education Resources Information Center (ERIC)

7.5 The ERIC database is sponsored by the US Department of Education to provide extensive access to education-related literature.

Set 1 Curriculum

#1	Curriculum	#19	#4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18
#2	National Curriculum		
#3	#1 OR #2		
#4	Breadth (ft)	#20	#3 and #19
#5	Depth (ft)		
#6	Content (ft)	#21	Curriculum content
#7	Impact (ft)	#22	Curriculum design
#8	Inclusion (ft)	#23	Curriculum development
#9	Outcomes (ft)	#24	Curriculum evaluation
#10	Purpose (ft)	#25	Curriculum improvement
#11	Skills (ft)	#26	Curriculum innovation (ft)
#12	Statutory requirements (ft)	#27	Curriculum reform
#13	Structure (ft)	#28	Curriculum reorganization
#14	English (ft)		
#15	Mathematics (ft)	#29	#21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27
#16	Science (ft)		
#17	National language (ft)		
#18	Home language (ft)	#30	#20 OR #29

Set 2 Assessment

#31	Assessment	#42	Assessment for learning (ft)
		#43	Assessment of learning (ft)
#32	Accountability	#44	Continuous assessment (ft)
#33	Exemplification (ft)	#45	Examinations
#34	Focus (ft)	#46	External assessment (ft)
#35	Method (ft)	#47	Formative assessment (ft)
#36	Moderation (ft)	#48	Internal assessment (ft)
#37	Purpose (ft)	#49	Summative assessment (ft)
#38	Reliability	#50	Teacher assessment (ft)
#39	Value (ft)		
#40	#32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39	#51	#42 OR #43 OR #44 OR #45 OR #46 OR #47 OR #48 OR #49 OR #50
#41	#31 AND #40	#52	#41 OR #51

Set 3 Curriculum and assessment

#53	Curriculum and assessment (ft)	#58	Relationship (ft)
		#59	Review (ft)
#54	Arrangements (ft)	#60	structure (ft)
#55	Impact (ft)	#61	#54 OR #55 OR #56 OR #57 OR #58 OR #59 OR #60
#56	Links (ft)	#62	#53 AND #6
#57	Reform (ft)		

Set 4 Standards

- | | | | |
|-----|----------------------------|-----|----------------------------|
| #63 | Curriculum standards (ft) | #67 | Performance standards (ft) |
| #64 | Educational standards (ft) | #68 | #63 OR #64 OR #65 OR #66 |
| #65 | Learning outcomes (ft) | | OR #67 |
| #66 | National standards | | |

Countries

- | | | | |
|-----|------------------|-----|--------------------------|
| #69 | Canada (ft) | #76 | #71 OR #72 OR #73 OR #74 |
| #70 | Alberta (ft) | | OR #75 |
| #71 | #69 OR #70 | | |
| #72 | Finland (ft) | #77 | #30 AND #76 (set 1) |
| #73 | Korea (ft) | #78 | #52 AND #76 (set 2) |
| #74 | New Zealand (ft) | #79 | #62 AND #76 (set 3) |
| #75 | Singapore (ft) | #80 | #68 AND #76 (set 4) |

IDOX

7.6 IDOX provides access to policy documents, policy analysis, and research in all areas of public sector policy and practice including education and children's services.

- | | |
|-----|--------------------------------|
| #1 | Curriculum (ft) |
| #2 | National Curriculum (ft) |
| #3 | Assessment (ft) |
| #4 | Curriculum and assessment (ft) |
| #5 | National standards (ft) |
| #6 | Educational standards (ft) |
| #7 | #1 OR #2 OR #3 OR #4 OR #5 |
| | OR #6 |
| #8 | Canada (ft) |
| #9 | Alberta (ft) |
| #10 | #8 OR #9 |
| #11 | Finland (ft) |
| #12 | Korea (ft) |
| #13 | New Zealand (ft) |
| #14 | Singapore (ft) |
| #15 | #10 OR #11 OR #12 OR #13 |
| | OR #14 |
| #16 | #7 AND #15 |

Websites

7.7 The following websites were also searched:

List details
Alberta Education
Education, Audiovisual and Culture Executive Agency (EACEA)
The Finnish National Board of Education (FNBE)
INCA
International Association for Educational Assessment (IAEA)
Ministry of Education, Science and Technology (<i>MEST</i>), Republic of Korea
Korea Institute of Curriculum and Evaluation (<i>KICE</i>)
Korea Education & Research Information Service (<i>KERIS</i>)
Ministry of Education, New Zealand
Ministry of Education, Singapore
Ministry of Education and Culture, Finland
New Zealand Qualifications Authority
Organisation for Economic Cooperation and Development (OECD)
UNESCO including the International Bureau of Education, and the World Bank

Reference harvesting

7.8 We also searched the references of relevant documents

8 References

Alberta Education. (2011). Framework for student learning : competencies for engaged thinkers and ethical citizens with an entrepreneurial spirit. Edmonton: Alberta Education.

Andrews, C., Brown R. and Sargent C. with O'Donnell S. (2007). *Compulsory Assessment Systems in the INCA Countries: Thematic Probe* [online]. Available: http://www.inca.org.uk/pdf/Compulsory_assessment_systems.pdf [19 March, 2013]²⁵.

Bradshaw, J., Sturman, L., Vappula, H., Ager, R. And Wheeler, R. (2007). Achievement of 15-year-olds in Wales: PISA 2006 National Report (OECD Programme for International Student Assessment). Slough: NFER.

Bradshaw, J., Ager, R., Burge, B. and Wheeler, R. (2010). PISA 2009: Achievement of 15-Year-Olds in Wales. Slough: NFER.

Council of Ministers of Education, Canada (2013) Pan-Canadian Assessment Program [online]. Available: [http://www.cmec.ca/240/Programs-and-Initiatives/Assessment/Pan-Canadian-Assessment-Program-\(PCAP\)/Overview/index.html](http://www.cmec.ca/240/Programs-and-Initiatives/Assessment/Pan-Canadian-Assessment-Program-(PCAP)/Overview/index.html) [3 may, 2013]

Darling-Hammond, L. (2010). 'Policy frameworks for new assessments.' In: Darling-Hammond, L. *Assessment and Teaching of 21st Century Skills Draft White Paper 5: Policy Frameworks for New Assessments* [online]. Available: <http://atc21s.org/wp-content/uploads/2011/11/5-Policy-Framework.pdf> [19 March, 2013].

Department for Education (2011) *Review of the National Curriculum in England: What Can We Learn from the English, Mathematics and Science Curricula of High performing Jurisdictions?* (DfE Research Report 178). London: DfE [online]. Available: <https://www.education.gov.uk/publications/eOrderingDownload/DFE-RR178.pdf> [19 March, 2013].

Education Quality and Accountability Office (2013) The Power of Ontario's Provincial Testing Program [online]. Available: http://www.eqao.com/pdf_e/12/PowerOntProv_TestingProg_en.PDF [30 April, 2013].

Estyn (2011a). *The 'Developing Thinking Skills and Assessment for Learning' Programme*. Cardiff: Estyn [online]. Available: <http://www.estyn.gov.uk/english/docViewer/203248.5/the-developing-thinking-skills-and-assessment-for-learning-programme-june-2011/?navmap=30,163> [30 April, 2013].

Estyn (2011b). *The Skills Framework at key stage 2*. Cardiff: Estyn [online]. Available <http://www.estyn.gov.uk/english/docViewer/205514.4/the-skills->

²⁵ This article is now archived

[framework-at-key-stage-2-july-2011/?navmap=30,119,196,/?lang=en](http://www.inca.org.uk/10-11-24-Curriculum-and-assessment-models-for-the-home-language-ages-11-17.pdf) [30 April, 2013]

Eurydice (2012) Developing Key Competencies at school in Europe: Challenges and Opportunities for Policy [online]. Available: http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/145EN.pdf [30 April, 2013]

Filmer-Sankey, C., Sargent, C. and O'Donnell, S. (2010). *Curriculum and Assessment Models for the Home Language, Ages 11-17: Final Overview Report for Ofqual*. Slough: NFER [online]. Available: <http://www.inca.org.uk/10-11-24-Curriculum-and-assessment-models-for-the-home-language-ages-11-17.pdf> [19 March, 2013].

Finnish National Board of Education (2013a) Overview of the education system [online]. Available: http://oph.fi/english/education/overview_of_the_education_system [3 May, 2013]

Finnish National Board of Education (2013b) Basic education [online]. Available: http://oph.fi/english/education/basic_education [3 May, 2013]

Ginsburg, A. and Leinward, S. with Decker, K. (2009). *Informing Grades 1-6 Mathematics Standards Development: What Can be Learned from High performing Hong Kong, Korea, and Singapore?* Washington, DC: American Institutes for Research [online]. Available: <http://www.air.org/files/MathStandards.pdf> [19 March, 2013].

Government of Alberta (2013a) My Child's Learning: A parent resource [online]. Available: <http://www.learnalberta.ca/content/mychildslearning/> [3 May, 2013]

Government of Alberta (2013b) Alberta Education [online]. Available: <http://education.alberta.ca/> [3 May, 2013]

Hendrickson, K.A. (2012). 'Assessment in Finland: a scholarly reflection on one country's use of formative, summative, and evaluative practices', *Mid-Western Educational Researcher*, **25**, 1-2, 33-43.

INCA International Review of Curriculum and Assessment Frameworks Internet Archive (2011). *Review of the National Curriculum in England: Report on Subject Breadth in International Jurisdictions* (DFE Research Report 178A). London: DFE [online]. Available: <https://www.education.gov.uk/publications/standard/publicationDetail/Page1/DFE-RR178A> [19 March, 2013].

Kim, K., Song, M-Y., Kim, W., Choi, I., Shin, J., Park, I-Y., Kim, J., and Kim, S. (2012). *NAEA (National Assessment of Educational Achievement) 2011 Results and Implications: Trends of Achievement in 6th Grade* (Research Abstracts). Seoul: Korea Institute for Curriculum and Evaluation [online]: Available: <http://kice.re.kr/en/board.do?boardConfigNo=139&page=3&menuNo=410&action=view&boardNo=30611> [19 March, 2013].

KICE (Korea Institute for Curriculum and Evaluation) (2012) *Research Abstract: Design of the competencies-based national curriculum for the future society*. [online]: Available: <http://kice.re.kr/en/board.do?boardConfigNo=139&menuNo=410&action=view&boardNo=30586> [4 October, 2013]

Korea Institute for Curriculum and Evaluation (2013). *Educational evaluation* [online]. Available: <http://kice.re.kr/en/contents.do?contentsNo=147&menuNo=403> [3 May, 2013]

Le Metais, J. (2003). 'International trends in curriculum frameworks', *Educational Forum*, **67**, 3, 235–247.

Lee, K., Kwak, Y., Lee, S., and Choi, J. (2012). *Design of the Competencies-based National Curriculum for the Future Society*. Seoul: Korean Institute for Curriculum and Evaluation. [online]: Available: <http://kice.re.kr/download.do?fileNo=95182&ksMenuNo=510> [4 October, 2013]

Looney, J.W. (2009). *Assessment and Innovation in Education* (OECD Education Working Papers No. 24). Paris: OECD [online]. Available: <http://www.oecd-ilibrary.org/docserver/download/5ksf3jp8w90s.pdf?expires=1360229988&id=id&acname=guest&checksum=A401FEAEB2C8EF91B6CCAA65B547576B> [19 March, 2013].

Ministry of Education, Singapore (2013) Education system [online]. Available: <http://www.moe.gov.sg/education/> [3 May, 2013]

Nusche, D., Laveault, D., MacBeath, J. and Santiago, P. (2012). *OECD Reviews of Evaluation and Assessment in Education: New Zealand 2011*. Paris: OECD [online]. Available: <http://www.oecd.org/edu/preschoolandschool/49681441.pdf> [19 March, 2013].

Oates, T. (2010). *Could Do Better: Using International Comparisons to Refine the National Curriculum in England*. Cambridge: Cambridge Assessment [online]. Available: http://www.cambridgeassessment.org.uk/ca/digitalAssets/188853_Could_do_better_FINAL_inc_foreword.pdf [19 March, 2013].

O'Donnell, S. (2001). *Thematic Probe: Curriculum Review - an International Perspective*. Slough: NFER [online]. Available: <http://www.inca.org.uk/pdf/062001review.pdf> [19 March, 2013]²⁶.

Organisation for Economic Co-operation and Development & UNESCO (2001) *Literacy Skills for the World of Tomorrow - Further results from PISA 2000*. Paris: OECD

Organisation for Economic Co-operation and Development (2004) *Learning for Tomorrow's World – First Results from PISA 2003*. Paris: OECD

²⁶ This article is now archived

Organisation for Economic Co-operation and Development (2007) PISA 2006 Science Competencies for Tomorrow's World, Analysis. Paris: OECD.

Organisation for Economic Co-operation and Development (2010) PISA 2009 Results: What Students Know and Can Do. Paris: OECD

Organisation for Economic Co-operation and Development (2011). *Strong Performers and Successful Reformers in Education: Lessons from PISA for the United States*. Paris: OECD [online]. Available: <http://www.oecd.org/pisa/46623978.pdf> [19 March, 2013].

Parsons J. and Beauchamp, L. (2012). *From Knowledge to Action: Shaping the Future of Curriculum Development in Alberta*. Edmonton, AB: Alberta Education [online]. Available: <http://education.alberta.ca/department/ipr/curriculum/research/knowledgetoaction.aspx> [19 March, 2013].

Province of British Columbia (2013) Foundation Skills Assessment [online]. Available: <http://www.bced.gov.bc.ca/assessment/fsa/> [3 May, 2013]

Ruddock, G. and Sainsbury, M. (2008). *Comparison of the Core Primary Curriculum in England to Those of Other High Performing Countries* (DCSF Research Report RW048). London: DCSF [online]. Available: <https://www.education.gov.uk/publications/eOrderingDownload/DCSF-RW048v2.pdf> [19 March, 2013].

Sargent, C., Byrne, A., O'Donnell, S. and White, E. (2010) *Thematic Probe: Curriculum Review in the INCA countries - June 2010* [online]. Available: http://www.inca.org.uk/Curriculum_review_probe.pdf [19 March, 2013]²⁷.

Sargent, C., Foot, E., Houghton, E. and O'Donnell, S. (2013) INCA Comparative Tables, March 2013 edition [online]. Available: http://www.nfer.ac.uk/shadomx/apps/fms/fmsdownload.cfm?file_uid=DA81E368-923A-8028-D122-5C8F249C52F1&siteName=nfer [3 May, 2013]

Schmidt, W.H., Houang, R. and Shakrani, S. (2009). *International Lessons About National Standards*. Washington, DC: Thomas B. Fordham Institute [online]. Available: http://www.edexcellencemedia.net/publications/2009/200908_internationallessons/20090826_International_Lessons_Report.pdf [19 March, 2013].

UNESCO-IBE (2012) World Data on Education: Finland [online]. Available: World data on education 2010/11 http://www.ibe.unesco.org/fileadmin/user_upload/Publications/WDE/2010/pdf-versions/Finland.pdf [3 May, 2013]

University of Otago (2012) National Monitoring Study of Student Achievement [online]. Available: http://nmssa.otago.ac.nz/files/EG_Issue_13.pdf [3 May, 2013]

²⁷ This article is now archived