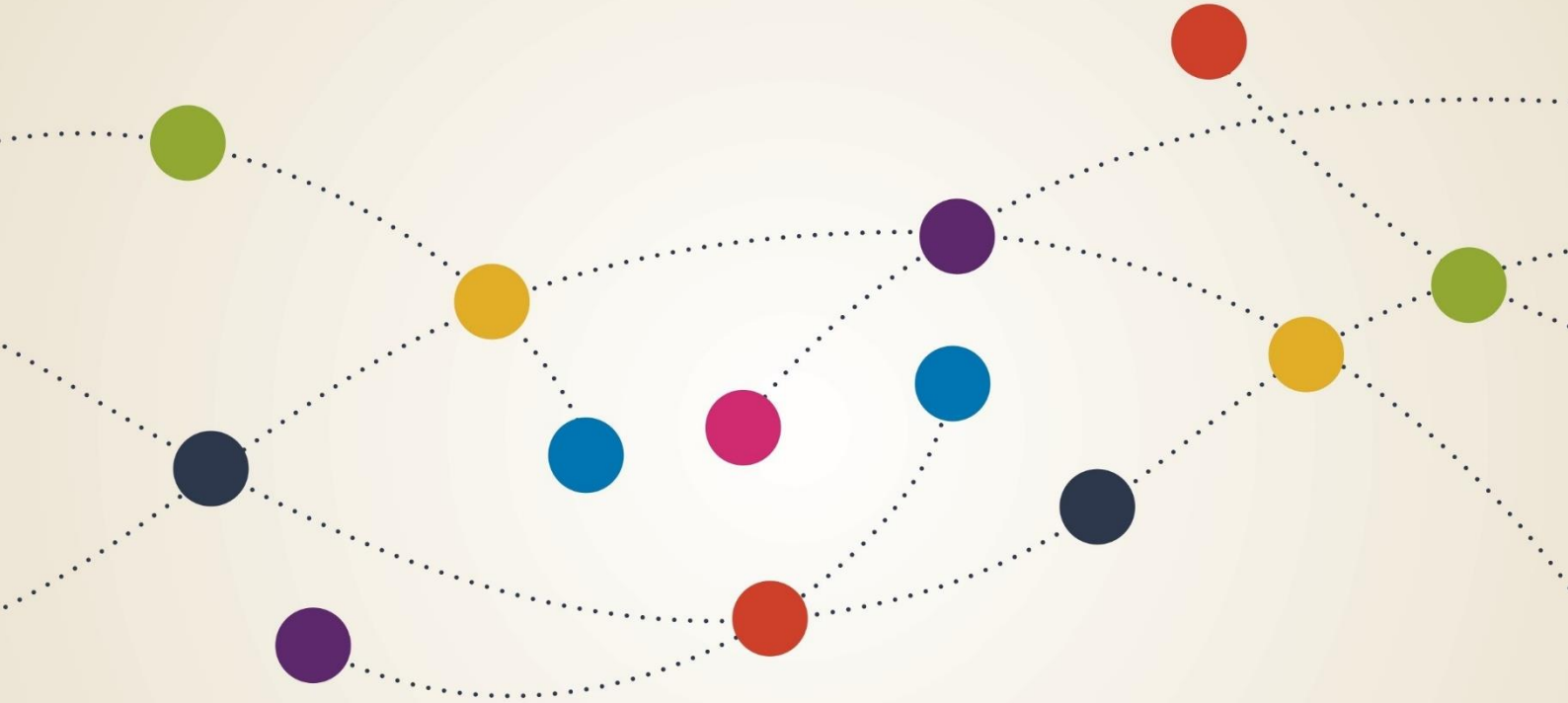

Research-Informed Analysis of 21st Century Competencies in a Redeveloped Primary Curriculum

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May 2018

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Final Report

May 2018

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1 Purpose, scope and structure of the report

The purpose of this report is to present a research-informed review and analysis of the key questions presented in the review specification. With regard to research sources, the report draws primarily on research reviews and syntheses that represent the current state of knowledge and thinking on topics, rather than on quoting lists of primary sources. The psychological research literature is referenced primarily for the research questions on clarifying definitions on the meaning of skills, dispositions, attitudes, values, etc., while responses to the later research questions draw on curriculum studies' literature. With regard to other educational systems, information was accessed primarily through national curriculum websites, although the author already had considerable knowledge of curriculum developments elsewhere through her previous work.

The report begins with a brief examination of the shift towards identifying broader learning goals for education and is then structured around the key questions which are slightly reordered to map onto the flow of the report. For example, the report begins with the definition of competency question and moves onto the question of the meaning of overarching key competencies. An additional question is added about the relationship between key competences and effective learning, as the question is implied in an earlier section of the specification. That said, the structure is as follows:

Section 2 briefly examines trends in the wider educational landscape on broader learning goals, on 2lst century skills and key competencies, identifying key influences, as well as likely educational benefits.

Section 3 examines the different uses of terminology associated with these broader learning goals, - skills, dispositions, attitudes, values, key competencies, literacies - and how key competencies are now understood according to the most theoretical positions advanced so far. (Key Questions 1 and 2)

Section 4 outlines a provisional research-informed classification for key competencies. (Key Question 4)

Section 5 outlines a research-informed theoretical view on what constitutes effective learning and how it relates to key competencies. (Key Question 3)

Section 6 identifies and describes competency frameworks from 7 jurisdictions, interrogates their content and maps it against the classification system identified in Section 4. The results are set out in a matrix format, with a commentary. It should be noted that six of the seven frameworks

described are not specific to primary education and cover all stages up to the end of secondary schooling in some instances. (Key Questions 4, 5 and 6)

Section 7 links the NCCA Aistear and Junior Cycle Key Skills frameworks through the examining the similarities/differences between them and the proposed classification of key competencies in Section 4. The results are set out in a matrix format with commentary. (Key Question 7)

Section 8 draws out some of the key implications of the analysis for curriculum design, curriculum development and implementation. (Key Question 8)

Section 9 concludes with a brief summary of key findings and issues from the report.

The specific Key Questions from the specification are in the Appendix.

2 The shift towards broader learning goals

Surveying the wider educational landscape across the world, there is a noticeable shift towards discussions of the purposes of education and a recognition of the need for broader learning goals, variously described as 2lst century skills, key competenc(i)es, or capabilities. The influences have come from various directions.

For many years, what students learn in schools has been critiqued, particularly in developed countries, as leading only to a **superficial understanding of curriculum topics** (e.g., Bransford et al., 1999; Pellegrino & Hilton, 2012). This level of understanding is perhaps sufficient to pass tests or examinations but not sufficiently robust to be applied beyond the school context in which the learning occurred. Students' understanding, it is argued, is fragile and fragmented, consisting of isolated and overly specific concepts without sufficient generality. Students can learn to solve problems when they are presented in predictable ways but not when they are encountered in less predictable and messy real world environments (e.g., Perkins, 2014). The general conclusion is that **learning is not sufficiently deep**.

As well as the dissatisfactions expressed about the quality of students' current learning, predictions about future 2lst century challenges have led to a **re-appraisal of what students need to learn in school to prepare them for their future lives** - challenges that will require a more problem solving approach, greater creativity, the ability to deal with complexity, resilience, and, overall, a 'learning to learn' approach. For example, the **changing nature of work patterns** and the nature of work (from routine tasks to more complex tasks), pervasive use of technology and automation, as well as global challenges such as climate change, inequalities and sustainable development are commonly cited. Alongside the futuristic economic arguments, social justice theorists argue that young people not only have the **right to political participation** but they also need the 'capabilities' to exercise those rights (e.g., Nussbaum, 2000), and that education is central to their development.

From a more empirical educational viewpoint, the evidence base for the **impact of these broader types of learning on traditional indicators of school achievement** is also accumulating. For example, Rosen et al (2010) synthesised what is currently known about the predictive power of "non-cognitive skills" (essentially personal attributes other than intelligence), and identified intrinsic motivation and self-efficacy (beliefs about the self) as predicting performance on school grades and tests. In a longitudinal study following 15 year olds into adult life, Rauber (2007) reported the importance of motivation and self-regulation on both school achievement and later success in life. Drawing conclusions from a review of reviews on the impact of personality and other non-cognitive

factors on school achievement, Pellegrino & Hilton (2012) pointed to substantial evidence for the positive impact of conscientiousness (staying organised, being responsible, exerting effort and being hardworking), and the negative impact of anti-social behaviour on school achievements and job outcomes. As well, many of these factors have indirect effects on school outcomes through their influence on school attendance, study habits, and general participation in school activities.

Reflecting these trends, **national curriculum authorities** in many countries have begun to embrace these **broader learning goals** beyond subject knowledge and skills, and even beyond the traditional skills generally considered as gateways to future learning, such as literacy and numeracy. Specific examples will be described in the following sections. These broader learning goals have been characterised in different ways in terms of 2lst century skills and key competenc(i)es but also in terms of new domains for education beyond traditional school subjects, such as, for example, education for citizenship, for intercultural understanding, for sustainable development, and for global awareness, as well as a focus on students' social-emotional wellbeing, and on their physical and mental health. For the most part, the discussion has been about school learning in general rather than specifically about primary education, although early years' education has received its own distinctive analysis.

These concerns about what students need to learn for successful future lives is not confined to national/state curriculum bodies. There is now **extensive involvement with these issues at international level.**

- For example, both the OECD (OECD, 2018, *The future of education and skills 2030: The future we want*) and the International Bureau of Education/UNESCO (Marope et al., 2017a, *Future competences and the future of the curriculum*) have groups working on how best to conceptualise key competencies in curriculum frameworks.
- There have been various European Reviews of Key Competences and their assessment (e.g., Cook, Weaving & Gordon, 2012 for European Schoolnet).
- An international research project on assessment, Assessment and Teaching of 21st century skills, was funded by Cisco Systems, Intel Corporation and Microsoft (Assessment and Teaching 2lst Century Skills, 2010).
- The OECD PISA programme has already conducted international assessments of 15 years olds in problem solving (PISA, 2012) and collaborative problem solving (PISA, 2015) and are planning an assessment of global competence for the same age group in 2018 (PISA, 2018).

- The OECD's Centre for Educational Research and Innovation (CERI) has just launched a study on the assessment of social and emotional skills (OECD, 2017).
- The Asia Society has produced guidance for educators on the assessment of 21lst century skills (Soland et al., 2013).
- A global partnership, called New Pedagogies for Deep Learning, has a focus on 'deep learning competencies'.

3 Making sense of the terminology – skills, dispositions, attitudes, values, competencies or what?

With regard to conceptualising and labelling these new types of learning, there is a noticeable shift not just in the terminology used but also in the underlying meaning of what is being referenced. The term 'skill' – as in 2lst century skills – still dominates discussions, but more recently the terms 'competencies' or 'competences' are becoming more prevalent, due perhaps to the theoretical work on key competencies for a successful life and well-functioning society completed for the OECD's DeSeCo (Definition and Selection of Competencies) project (Rychen & Salganik, 2003; OECD DeSeCo Executive Summary, 2005). The European Commission had previously used the term key 'competences' but that term seems now overtaken by competencies, though not exclusively – for example, the IBE/UNESCO continue to use the term competence for their project on future competences (Marope et al, 2017a).

Before launching into a more detailed analysis of the distinctions between skills/competencies and related constructs, it might be useful to consider how these terms fit more generally into the ways in which people's abilities and personal characteristics have been described in the psychoeducational literature. For the most part, what people are able to do intellectually has been described as *abilities,* while other personal characteristics have been attributed to personality or, more specifically, to *personality traits*. This distinction between cognition and personality has been pervasive in the psychological study of the person for over 100 years. But both these terms – ability and personality traits – have become associated with more fixed, rather than dynamic, views of personal development; for example, that ability (intelligence) is fixed and not open to change through educational interventions or that personality traits are enduring patterns of behaviour that are relatively unresponsive to changes in context across the lifespan. In contrast, the terms skills (cognitive as well as social-emotional), learning/thinking dispositions, habits of mind or attitudes, competenc(i)es, point to a more dynamic view of personal development, suggesting that these personal attributes are malleable and open to educational influence, that they are learnable, and in the long run, that they are teachable (for a more extensive treatment of these issues, see Kankaras, 2017). With these points in mind, we will examine some of the terms in greater depth.

Skills: Being skilful generally refers to carrying out some action with a degree of proficiency, doing it well rather than poorly - implying that there are degrees of skilfulness, and that skills can be learned and improved. In the psychological literature, skills and their acquisition are historically associated with the development of psychomotor actions, for example, learning to type, learning to ride a

bicycle, learning to drive, to play the piano, or the psychomotor co-ordination required to play a specific sport like golf or football. But the term skill is commonly used now in association with a vast array of more complex cognitive and social acts – reading skills, communication skills, learning skills, thinking skills, key skills, and even life skills. The merit of using the term in relation to these more complex areas is what we know about how skills are learned – that learning is helped by observing someone else performing the skill, so modelling the skill is important; understanding the elements of the skill is helpful, as well as practicing with corrective feedback; and testing the limits of learning by transferring the skill to contexts beyond the initial learning (see Speelman & Kirsner, 2008 for a history of research on skill acquisition). Despite this, characterising these more complex areas as 'skills' is still critiqued as being reductionist and as not fully capturing what it means to carry out these actions well - that there is more to it than that.

Dispositions: A disposition generally refers to the tendency for person to act in a certain way in given circumstances. In the context of learning and thinking dispositions, the phrase " a will as well as a skill" is often used, pointing out that it is not sufficient to be able to act skilfully but the person must be motivated to do so habitually, and also be alert to the contexts in which it is appropriate to act in that way. In defining their approach to thinking dispositions, Perkins and his colleagues (Perkins, Jay & Tishman, 1993) include three elements – the inclination to act in a certain way, being sensitive to the contexts where it is appropriate, as well as the ability to follow through on the action. So the term disposition brings into play a bigger picture about what it means to do something well, beyond being skilful. It raises the importance of responding appropriately to the demands of the context, of being motivated to act habitually in a certain way, and even of the values associated with the action. For example, the disposition to be open-minded is often cited as important for critical thinking but being open-minded, in itself, needs to valued and/or respected by the person or in the cultural environment in which the person is acting. Several types of thinking dispositions have been identified, for example, being open-minded, seeking truth and clarity, seeking alternatives, being precise (e.g., Ennis, 1996). Perkins and colleagues have identified seven broad thinking dispositions: to be adventurous in thinking rather than too narrowly focussed; to be curious and oriented towards problem-finding; to seek understanding and build explanations; to be planful and strategic; to be intellectually careful and give reasons; and to be metacognitive. Costa & Kallick's (2014) 'habits of mind' have roughly the same meaning and cover much of the same ground. The idea of 'learning dispositions' has been extensively discussed by Carr & Claxton (2002), especially with reference to early years' education.

Attitudes: An attitude generally refers to a tendency for a person to evaluate something (other person(s), events, objects) favourably or unfavourably. In the psychology literature, it is considered to include an emotional overtone, a cognitive evaluation (positive or negative) and a tendency to behave in a certain way (Eagly & Schaiken, 1993). While attitudes can influence behaviour, they tend to be context specific, are susceptible to social influence and thus are open to change. This is a significant point in an educational context. Important attitudes related to learning are attitudes toward school itself or towards a specific subject ("I don't like mathematics") or towards the self-as-learner. With regard to self-as-learner, a well-researched attitude is the notion of self-efficacy which refers to the extent to which a person believes that they are capable of accomplishing future tasks and of being successful ("I can do") (Bandura, 1997). Self-efficacy can influence a person's response to learning challenges, their degree of persistence and the amount of effort they exert, as well as how they respond to mistakes and disappointments. A related attitudinal concept is the idea of fixed and growth mind-sets, popularised by Carol Dweck's work on attitudes to intelligence and learning, and the role of effort in what it means "to be smart" (Dweck, 2007).

Values: Values refer to the beliefs that a person holds about what is desirable – for themselves and/or for society more generally. Like attitudes, they are emotionally laden, have an evaluative component (what is desirable or not), and motivate actions. Unlike attitudes, they tend to transcend contexts and apply to many situations. They are standards against which people judge what is desirable or not. A well-researched theory of values (Schwartz, 2012) has argued that there are ten foundational human values depending on the desired goal that is motivated by the value. He argues that these values are universal across cultures, though expressed and prioritised differently in different cultures. Examples that might be important for education in the context of this paper are: valuing self-direction and acting autonomously; valuing being stimulated through seeking novelty, challenge or excitement; valuing achievement through personal success according to social standards; valuing benevolence by preserving and enhancing the welfare of those with whom we are in frequent contact; valuing universalism through understanding, appreciating, tolerating and protecting all people and nature; valuing tradition through respect, commitment and acceptance of the customs and ideas that one's culture or religion provides. Values can be expressed in an ongoing way through attitudes and behaviours to people and events, and of course they can be in conflict with one another. For example, benevolence, which tends to favour one's own group can be in conflict with more universal values.

Competencies: Although key competencies are often substituted for key skills, they do have different meanings, specifically in terms of their focus on (1) the action in response to the demands

of situation, and (2) the inclusion of knowledge as a key component that informs the action. The DeSeCo project represents the most advanced theoretical position so far, although several new developments are ongoing. The DeSeCo analysis is on preparing young people for a successful life in a well-functioning society, so that they can thrive and flourish. The focus is on **action in relation to the demands or level of challenge in a context -** so ALL the resources available to the person needs to be brought to bear on the action. According to this view, a competency includes – prior knowledge relating to the context, cognitive skills, practical skills, social skills, emotions, attitudes, values – co-ordinated to enable the person to act in relation to a specific demand.

> " - a competency is more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilising psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competency that may draw on an individual's knowledge of language, practical IT skills and attitudes towards those with whom he or she is communicating" (OECD DeSeco, Executive Summary, 2005 , p. 4).

Competence is a complex idea because it looks, as it were, in both directions at once: on the one hand, towards cognitive skills and personal attributes like dispositions, attitudes and values, and, on the other hand, towards the prior knowledge which the person has accumulated that is relevant to the context in hand. However, the emphasis is more on what to do with the knowledge rather than on the knowledge itself. To get some idea of how all these components are envisaged as interrelating for global competence, see Figure 1 below from the PISA Global Competence Project This is for illustrative purposes only. Also, note that the likely attitudes and values to be included are 'openness to other cultures", "respect for other cultures", "responsibility", "valuing diversity" and so on. (These are missing from the graphic.)

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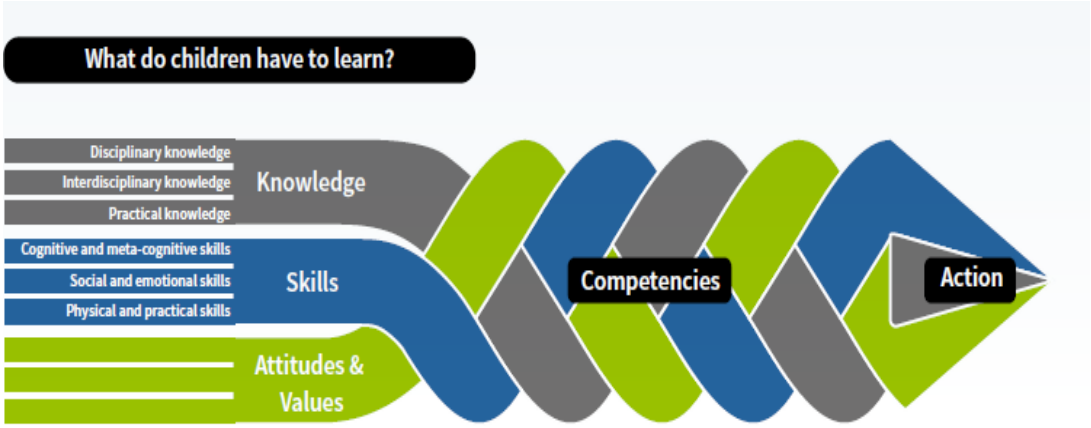
Figure 1 Illustration of the interrelationships between components of competency



While the concept of competency might be usefully applied to more specific areas of the curriculum, e.g., mathematical competence, scientific competence, the idea of **key competencies** grows from the likelihood that they will be useful across a range of different contexts, in school, family life and work. Indeed, the very idea of competencies being KEY is precisely because of their likely transversal nature - that they cut across different domains (transversal meaning intersection). I use the word 'likely' for now, and will return to it in the next section about learning and key competencies. At the highest level of performance then, a key competence is demonstrated across a range of contexts, with the person drawing on relevant knowledge resources, adapting and adjusting the mix to meet the demands of the situation. Using more friendly language, Perkins (2014), in his analysis of educating children for a changing world, speaks about key competencies as 'Big Know-How' – which he characterises as know-how that is worth learning - where "worth learning" means having both life-long and life-wide currency - hence the importance and benefits of formulating an overarching framework.

Literacies: Before moving away from definitions, it might be useful to comment on how the term literacies is now being used, as it often appears in the context of skills and competencies. Where previously the term literacy was confined to reading and writing, it is now used in a variety of ways to reference a high quality performance or know-how in a domain, as in science literacy, or with the use of tools, as in media literacy or digital literacy. When used in the context of cultural literacy, or financial literacy, or civic literacy, there is very little difference between that use and the meaning of key competencies. As you will see in subsequent sections, 'tool use' and 'literacies' emerge in several international and national key competency frameworks.

4 A proposed research-informed classification for key competencies

Several sources of international research and analyses were interrogated to propose a classification system for key competencies going forward. Three international frameworks were analysed – (1) the OECD DeSeCo key competences previously referenced; (2) a classification from the international project for Assessing and Teaching 2lst century skills, called Knowledge, Skills, Attitudes, Values and Ethics (KSAVE); (3) a framework from the US Partnership for 2lst Century learning (P21); (4) an extensive research synthesis commissioned by the US National Research Council to define deeper learning and 2lst century skills (Pellegrino & Hilton, 2012), which surveyed the research literature on individual differences in personality attributes and cognitive abilities and cross-referenced them with extensive lists of published 2lst century skills.

Table 1 maps the findings from these four analyses. The first point to notice is the similarities in the basic categories that are common across the frameworks (shaded in darker grey): cognitive processes and thinking; interpersonal processes as in collaborating with others and communication; and personal (or intrapersonal) processes needed to act independently, take initiatives and be self-directed, leading to leadership initiatives, etc. Another set of commonalities relates to literacies, specifically to new technologies and the capacity to use 'tools' more generally (shaded in a lighter grey). Finally, there is a category that is sometimes described as a competence or literacy but also as an interdisciplinary theme, as in cross-cultural or global awareness or citizenship (in white). Alignment is not perfect across the frameworks but sufficient to be confident about proposing a provisional classification to include at least three categories, with a possible five categories, depending on whether literacies are included or whether emergent transdisciplinary domains (citizenship, global awareness) are identified as key competencies or called by some other name.

An important feature that distinguishes the first three categories from the final two is their point of reference. While all are learner/action focused, the point of reference for the cognitive, interpersonal and intrapersonal is PERSONAL, while the point of reference for literacies tends to be TOOL focused, and the point of reference for the final category relates to 2lst century CHALLENGES - global, cultural, civic, economic, health – that may require a transdisciplinary perspective.

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NCCA key competencies McGuinness Final Report

Table 1 International Key Competency/2lst Century Skills Frameworks

DeSeCo (OECD) Key Competencies	KSAVE Model (atc21s) Knowledge, Skills, Attitudes, Values, Ethics (KSAVE)	Partnership for 2lst century Learning, P21 (USA)	Research-based Classification Pellegrino & Hilton (2012)
Thinking (considered to be at the heart of the other competencies)	**Ways of thinking** • Creativity and innovation • Critical thinking, problem solving and decision making • Learning to learn, metacognition	**Learning and innovation skills** • Creativity • Innovation • Critical thinking • Problem-solving	**Cognitive** • Cognitive processes and strategies • Knowledge and information sources and biases, communication • Creativity and innovation
Functioning in groups • Relate to others • Cooperate in teams • Manage and resolve conflicts	**Ways of working** • Communication • Collaboration	**Learning and innovation skills** • Communication • Collaboration • Social and cross-cultural	**Interpersonal** • Teamwork and collaboration • Leadership
Acting autonomously • Act within the big picture • Form and conduct life plans and personal projects • Defend and assert rights	(located in **Living in the World**)	**Life and Career Skills** • Initiative, self-direction • Flexibility and adaptability • Leadership and responsibility • Productivity and accountability	**Intrapersonal** • Intellectual openness • Work ethic, conscientiousness • Positive self-evaluation
Using tools interactively • Use language, symbols and texts • Use knowledge and information • Use technology	**Tools for working** • Information literacy • ICT literacy	**Information , media and technology skills**	(located in **Cognitive**)
	Living in the World • Citizenship –local and global • Life and career • Personal and social responsibility, • Cultural awareness	**2lst Century Themes** • Global awareness • Financial Literacy • Civic Literacy • Health Literacy • Environment Literacy	

For the purposes of this paper I will elaborate on the meaning of the first three key competencies – **cognitive, interpersonal and intrapersonal**, taking into account that key competencies consist of skills, dispositions, attitudes and values, as well as knowledge domains (including transdisciplinary) where competences are learned, practiced and demonstrated. I will use the language of skills, dispositions and values (to include attitudes), reminding the reader that this is illustrative and not intended to be comprehensive.

Cognitive Competency: includes developing *cognitive skills* like higher-order thinking – reasoning and critical thinking, thinking for understanding, creativity and inventiveness, problem-solving, decision-making, systems thinking, information retrieval and processing. *Dispositions* related to being able to think well are – being open-minded, seeking clarity and truth, being curious, being persistent, being adventurous - and other habits of mind often associated with high quality thinking. Underpinning *values* might be the desire to seek challenges, to need stimulation, to achieve well, to be well informed and act with integrity.

Interpersonal Competency: includes developing *social-emotional skills t*o maintain personal relationships and work relationships, *listening skills*, *teamwork skills*, *skills to negotiate and influence* others, to take the lead in groups, and to navigate in social and culturally sensitive ways, to *communicate clearly* and be understood. *Dispositions r*elated to interpersonal competency are - being respectful, empathetic, caring, being assertive, being transactional (give and take), being open to diversity, being reliable, taking responsibility. Underpinning *values* might be the desire to be fair-minded, to be agreeable, to achieve well, to be trustworthy, to act ethically, to recognise interdependence.

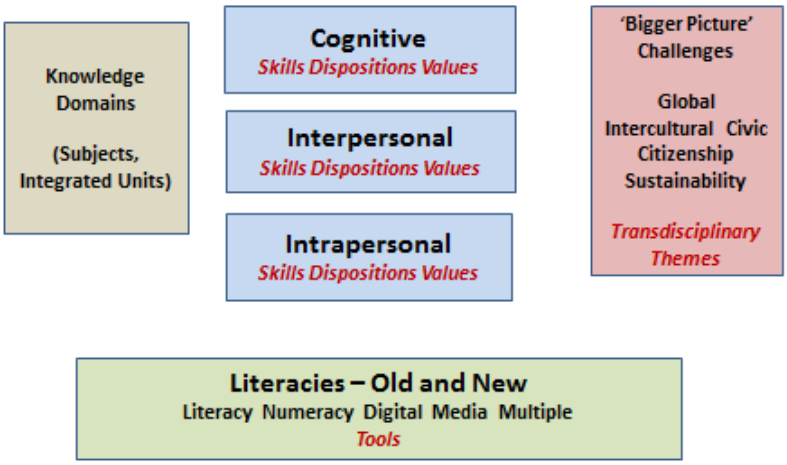
Intrapersonal Competency: orchestrates many of the other skills and dispositions in a dynamic way, it covers *skills such as developing self-awareness* about thoughts, feelings and approaches to learning, *skills in metacognitive thinking and emotional regulation*, recognising one's own strengths, weaknesses and biases about school learning (in this context), managing personal plans and projects, seeking out and responding to feedback. Associated *dispositions* are – wanting to improve, persisting and making an effort, being flexible and adaptable, striving for independence and 'being in charge', recognising and managing risk, believing in self-efficacy. Underpinning *values* are about seeking autonomy, agency, making a contribution, personal achievement and fulfilment, personal integrity, personal identity.

These may not be the only competences that a curriculum would want to promote but the suggestion here is that they are KEY because of their likely usefulness across many knowledge

domains, both in terms of traditional subjects in the curriculum, newly emerging hybrid subjects, or transdisciplinary themes or units. For example, many of the skills, dispositions and values associated with the above competencies can be reconfigured with a more transdisciplinary point of reference or bigger picture in mind, as in the earlier global competence example. Such competences may also be considered as transversal in the sense of cutting across more traditional knowledge boundaries and preparing students to respond to 21st century challenges but that conjures up a different meaning compared to the notion of 'being useful across contexts'.

In summary, Figure 2 summaries the findings from the analyses of the international trends and the proposed classification. The central boxes in BLUE represent the personal key competencies – cognitive, interpersonal and intrapersonal which are key in the sense that they useful across knowledge contexts - however that knowledge is characterised. But there is a second way in which key competences are being identified – related to these Bigger Picture Challenges, like global competence, intercultural, citizenship, sustainability and so on, represented in the PINK box. Being KEY here means something slightly different – in the sense that the problems to be solved transverse, cut across, or intersect disciplines – transdisciplinary themes. Finally, the GREEN box represents importance of key literacies, supporting and mediating the influence of the other competencies.

Figure 2 International Trends in Key Competencies: A Proposed Classification



5 Key competencies and effective learning

Contemporary research writings on the nature of effective learning recognise that there is more to it than the rehearsal of 'to-be-remembered material' for subsequent reproduction or even good understanding. What constitutes effective learning is multi-layered. The purpose of this section is to align the conclusions from research on effective learning with the broad thrust of the types of learning identified in key competency frameworks.

To do this, several research reviews with a specific focus on education practice are used: the US National Research Council's *How People Learn* (Bransford, Brown & Cocking, 1999) and subsequent related publications, *How Students Learn: History, Mathematics, and Science in the classroom* (Donovan & Bransford, 2005); the International Academy of Education's *How Children Learn* (Vosniadou, 2001); and the OECD's *The Nature of Learning: Using Research to Inspire Practice* (Dumont, Istance & Benavides, 2010), particularly the chapter in that volume by de Corte on *Historical Developments in the Understanding of Learning*.

Building on this body of research, de Corte and his colleagues have identified the concept of 'adaptive competence' - an idea which has become very influential in understanding how flexible (or not) prior learning is in response to new learning challenges. Adaptive competence is defined as "the ability to apply meaningfully-learned knowledge and skills flexibly and creatively in new situations" (de Corte, 2010, p. 47) as opposed to routine learning which is comprised of being able to complete typical school tasks competently but without deeper understanding. The key adjective here is 'adaptive', indicating a readiness and an ability to successfully respond to changing contexts and future learning challenges – what transfer of learning usually implies.

De Corte then outlines the key ingredients of adaptive competence, see Table 2 adapted from de Corte (2010, p. 47). Note that acquiring adaptive competence means learning much more than might be traditionally expected of well-mastered subject knowledge and subject skills – the well-organised and flexibly accessible domain-specific knowledge referenced in the first row in Table 2. Adaptive competence also means that learners become well practised in using a repertoire of what are termed heuristics or thinking plans and strategies. While these might first be encountered and learned in specific contexts, they have the potential to be more generally applicable across contexts, hence their heuristic or transversal value. The other three ingredients recognize the importance of newer forms of learning – knowledge about how to learn, how to organize and manage oneself as a learner, underpinned by positive beliefs about oneself as a learner and about the to-be-learned material. The dynamic integration of these ingredients creates adaptive competence, according to

this view. While the body of research reviewed by De Corte comes mainly from student learning in core school subjects such as mathematics, history and science, the picture of effective learning presented here is in sharp contrast to the more minimalist conceptions of learning-as-remembering, or even learning-as-understanding that are often portrayed in earlier theories of learning. In particular, the idea of adaptive competence foregrounds the role of the learner as an agent in their own learning (e.g., knows about learning; is self-regulatory; can build knowledge and use it flexibly) rather than as a passive recipient of pre-existing knowledge. This image of learning links directly with the kind of learning envisaged through the development of key competencies. For a more elaborated social psychological discussion of human agency, see Bandura (2001).

Table 2 Key Ingredients of Adaptive Competence (adapted from de Corte, 2010, p 47)	
Well organised and flexible knowledge	Well-organised and flexibly accessible domain-specific knowledge bases involving the facts, symbols, concepts and rules that constitute the contents of subject-matter field(s) *or any to-be-learned material.*
Heuristic methods	Heuristic methods, problem solving strategies for analysing and transforming problems (e.g., breaking a problem into parts, making a graphic representation of problem) which do not guarantee but significantly increase the probability of finding the correct solution through a systematic approach to the task. Having a repertoire of these thinking plans for a variety of different types of thinking – critical thinking, creative thinking, systems thinking, etc.
Metacognitive knowledge	Meta-cognitive knowledge involves knowing about what makes for good thinking and learning (e.g., believing that thinking can be improved through learning and effort, or that motivation and emotions can be actively used to improve learning, like becoming aware of one's fear of failure in mathematics).
Self-regulatory skills	Self-regulatory skills, regulating one's cognitive processes/activities by monitoring, for example, ones' own problem solving processes, learning how to self-correct; skills regulating emotional and motivational states, like maintaining attention, inhibiting distractions and staying on task.
Positive beliefs	Positive beliefs about oneself as a learner in general and in a particular subject (or context), about the classroom or other context in which learning takes place, and about the more specific content within the domain, *or any to-be-learned material.*

The table below, Table 3, maps these key components of effective learning against components of key competencies. The component which is noticeably missing is the interpersonal domain, which is perhaps not surprising given the focus on *individual* learning in much of the school--based learning research literature.

Table 3 Connecting Research-Informed Models of Effective Learning and Key Competencies

Effective Learning Adaptive Competence Model (de Corte and others)	**Components of Key Competencies**
Well organised flexible knowledge – implying making connections	Core school subjects, integrated units, transdisciplinary themes……..
Heuristics, thinking plans and thinking organisers	Cognitive skills – critical thinking and reasoning, creative thinking, problem solving, decision-making, systems thinking……..
Metacognitive knowledge Self-regulatory skill	Intrapersonal – knowledge about oneself as a learner, self-regulation, including emotional regulation……
Positive beliefs	Intrapersonal – thinking and learning dispositions, growth mind-sets, beliefs about learning, self-efficacy, underpinning values……

Central to the idea of adaptive competence is the transfer of learning, and central to the claim for competencies being key is their transversal potential, or applicability across a wide range of contexts. So it is argued that key competences are a good vehicle for the transfer of learning, to the extent that the authors of the review of 2lst century skills and deeper learning concluded:

> "the link between deeper learning and 21st century competencies lies in the classic concept of transfer— the ability to use prior learning to support new learning or problem-solving in culturally relevant contexts. We define deeper learning not as a product but as processing — both within individual minds and through social interactions in a community — and 21st century competencies as the learning outcomes of this processing in the form of transferable knowledge and skills that result." (Pellegrino & Hilton, 2013, Chapter 4, p. 74)

It should be emphasised that the transversal nature of key competencies may not be immediately obvious to learners, or even to teachers. The competencies need to be taught in ways that make them more likely to transfer. For example, a cognitive skill is likely to learned, practiced and demonstrated in a specific context, mostly in a subject-based teaching unit. It is likely to remain 'stuck' in that context, unless a metacognitive approach to teaching helps students become more aware of the cognitive skill being used and how it might be useful in another context – how it could transfer. If this scenario is repeated across contexts/lessons and across knowledge domains, then students begin to make connections, see similarities and differences between the contexts, and transfer becomes more possible. So the claim that key competencies are transversal will be true only if their transversal nature is realised through a metacognitive approach to teaching (see McGuinness, 2005 on the role of metacognition, and Swartz & Parks, 1994; Swartz et al, 2007 on the general approach). Although the transversal nature of interpersonal and intrapersonal competencies seems less problematic, they too will be experienced, learned and practiced in a specific context and some metacognitive 'surfacing' of key features of the skills and dispositions will be needed if they are to transfer successfully.

6 Comparing Key Competency Frameworks across countries

For the purposes of comparison, seven countries/states were selected whose curriculum includes an **explicit key competency framework**, though different terminology may be used to describe it. A number of criteria informed the selection:

- the framework was described in some detail, was well explained and justified in curriculum documents available from websites and written in English;
- the curriculum framework was created within the last ten years; (the exception is the International Baccalaureate's Primary Years Programme which was included for reasons described below);
- the scale of the education system in terms of population size was relatively similar to Ireland (hence why individual states were selected from larger education systems, for example, British Columbia from Canada, and Victoria from Australia, and where educational policy is devolved to state level);
- countries that were culturally similar to Ireland (e.g., near neighbours, Northern Ireland, Finland), as well as those that were culturally different (e.g., Singapore);
- educational systems that had the tradition of a relatively centralised curriculum (Northern Ireland, Singapore) as well as those with more local and school level control (Finland, New Zealand, Victoria);
- systems with a reputation for performing very well in international league tables (e.g., Finland, Singapore, British Columbia).

Six countries or individual states were selected – Northern Ireland, New Zealand, Singapore, Victoria/Australia, British Columbia/Canada and Finland.

The final framework included was the International Baccalaureate's Primary Years Programme. Although this falls outside the time frame as it was first introduced in 1997, it has been adopted by approximately 1300 primary schools (both private and public schools) across five continents. In addition, it has a distinctive curriculum design in terms of a concept-based curriculum and teaching through transdisciplinary units of inquiry, which adds to the discussion on the relative balance between 'knowledge' and competencies in curriculum frameworks.

For the sake of clarity in terminology, all 7 frameworks[1] will be called the **country key competency frameworks**, and will be distinguished from the **international key competency frameworks** which were referenced earlier in this report.

6.1 Mapping Country Key Competency Frameworks

Table 4 maps the country key competency frameworks in matrix format along several dimensions. I will first just describe the main headings in the table to help the reader navigate their way through it. I will then return to describe the substance of the findings from the mapping in more detail and draw some conclusions in relation to the Key Questions 4, 5, 6 and 7.

The first two rows in the matrix simply name the countries, the exact names of the frameworks (note the different terminologies), and the date they were introduced. Some countries may have had previous frameworks, for example, Singapore and Victoria, but the versions described here are the most recent. The main section in the matrix – rows 3, 4, 5, 6, and 7 – interrogate the country frameworks using the classification of key competencies proposed in Section 4 – cognitive, interpersonal and intrapersonal. A category for 'bigger picture' competences and literacies is also used to capture the full range of what was described in the country frameworks. The focus for the matrix then shifts to how the country organises knowledge in their curriculum, and their approach is very briefly captured in the matrix in row 8. Finally, because the overall balance between knowledge and competences is sometimes indicated in the Aims and Values underpinning the curriculum, these are recorded in rows 9 and 10, based on the information I could readily access through the curriculum documentation that was available to me.

[1] The specification requested a comparison with eight jurisdictions, but the author felt that the main comparative points had been achieved with seven examples.

	Table 4 Comparison of Key Competency Frameworks across countries						
Country/ State	**Northern Ireland**	**New Zealand**	**Singapore**	**Victoria/ Australia**	**British Columbia/ Canada**	**Finland**	**IB Primary Years Programme (PYP)**
Framework Name	**Thinking Skills and Personal Capabilities (2007)**	**Key Competencies (2007)**	**2lst Century Competences ("Swiss-roll" metaphor) (2010)**	**General Capabilities (2014)**	**Core Competencies (plus Curricular Competencies (2016)**	**Transversal Competences (2016)**	**Learner Profile (supported by several skills frameworks) (1997)**
	Classification of Key Competencies						
Cognitive	Managing information; Thinking, problem-solving, decision-Making; Being creative	Thinking	Critical and inventive thinking	Critical Thinking; Creative Thinking	Thinking, creative and critical	Thinking and learning to learn	Students who are: Knowledgeable; Inquiring; Thinking; (thinking skills, research skills)
Interpersonal	Working with Others	Relating to others; Participating and contributing	Social awareness; Relationship management; Communication; Collaboration	Social	Communication; Social responsibility	Cultural competence, interaction and expression	Communicating; Caring (social skills, communication skills)
Intrapersonal	Self-Management	Managing self	Self-awareness; Self management; Responsible decision-making	Personal	Positive personal and cultural identity; Personal awareness and responsibility	Taking care of oneself and others; Managing daily activities	Principled; Open-minded; Risk-taking; Balanced; Reflective

							(self-management, PYP attitudes
'Bigger Picture' Global, Citizen Intercultural, Sustainable Development	Contributor to Society – e.g., citizenship, media awareness, sustainable development	Participating and contributing	Civic literacy; Global awareness	Ethical understanding; Intercultural understanding; Cross-curricular priorities – Aboriginal, Asia, sustainable development	Aboriginal Perspectives	Participating and influencing, building a sustainable future	International mindedness
Literacies	Communication; Using number; ICT	Language, symbols, text	Cross curricular skills; Information skills	Literacy, numeracy, ICT	Literacy and Numeracy, ICT	Multiple literacies, ICT	
	Organisation of Subject Knowledge						
Knowledge	5 Areas of learning. Lightly specified, including personal development mutual understanding in primary; key elements for cross-curricular priorities in post-primary	8 areas of learning, Lightly specified	6 learning area, includes character and citizenship education, plus co-curricular learning	8 areas of learning, specified in detail Cross-curricular priorities – Aboriginal, Asia, sustainable development	Concept-based, Big Ideas per subject , 11 subject areas, content lightly specified,	18 subjects; integrated environment studies in primary grades; one interdisciplinary module each year	Concept-based, subjects are taught primarily through six units of inquiry per year on transdisciplinary themes

	Overarching Curriculum Aims and Values						
Values explicitly stated	Uniqueness of the individual; Equity, justice and human rights; Capacity to resolve conflicts through democratic means; Need to sustain the environment; Right to work according to personal preferences.	Excellence; Innovation, inquiry, curiosity; Diversity; Equity; Community and participation; Ecological sustainability; Integrity; Respect;	Respect; Responsibility; Integrity; Care; Resilience; Harmony;		Value Diversity	Uniqueness of individual; Equality and democracy; Cultural diversity; Sustainable way of living	Values are stated in the Learner Profile
Aims explicitly stated	To empower young people to achieve their potential; To make informed and responsible decisions through their lives.	Students will develop competencies they need to study, work, lifelong learning to realise their potential	Confident person; Self-directed learner; Active contributor; Concerned citizen	Prepare students for Lifelong learning; Social development; Active and informed citizens	'Educated Citizen'	Sustainable development; Sustainable lifestyles	International-mindedness

6.2 What are the key competencies that are being foregrounded across the country frameworks?

The first point to note is the differences between the terminology used to label the frameworks, and the shift from 'skills' and capabilities in the Northern Ireland Framework- which was one of the earliest in this tradition - through 'key competencies' to the newest term of 'transversal' competences with the emphasis on intersection. Despite these differences the overarching claim for the frameworks can be seen from the words, 'key', 'core', 'general', and 'transversal'.

A striking point is the degree of similarity between the country competency frameworks, and between the country frameworks and the international competency frameworks from Table 2. Perhaps this is not surprising given the likely cross-influences and dialogue between the two. The proposed classification for the first three key competencies – cognitive, interpersonal, intrapersonal – is clearly evident in the country frameworks, though there is less consistency in the meanings associated with 'intrapersonal' which varied from 'managing daily activities'(Finland) to 'maintaining personal and cultural identity' (British Columbia).

The most diverse category is what is included in the Big Picture (my label) – a mixture of types of learning characterised sometimes as an understanding (e.g., ethical, intercultural), sometimes as a literacy (e.g., civic), as awareness (e.g., media, global), or a cross-curricular perspective (Aboriginal) or cross-curricular priority (e.g., sustainable development). While these differences reflect the cultural nuances in the specific countries that were sampled, the complexity of terminology does reveal the need for some epistemological clarification around how best to characterise these broader learning goals. The most recent clarification tends to characterise these also as 'transversal' competences in the sense that they intersect different knowledge domains, creating either a new 'subject' or representing a transdisciplinary theme. Thus, it seems that there are two types of key or transversal competencies being included in the frameworks and how they relate to one another is not clear.

What is labelled as 'literacies' includes both the traditional meanings of literacy and numeracy, as well as the newer versions, mostly associated with digital technology and media. There is good agreement on this category across the frameworks. The only ambiguity is the more general label 'communication' which is sometimes included under literacies but more often under interpersonal competency.

6.3 What is the balance between competencies and knowledge in the primary curriculum? Do the competencies form the basis of the primary curriculum?

These two questions will be treated together.

All curriculum frameworks have adjusted their organisation of the subject curriculum in some way to give priority to their key competency perspective. For the most part, key competency frameworks have been introduced as part of a more general curriculum renewal motivated by a need to reduce the prescribed content of the national curricula, and to introduce more flexibility, even for jurisdictions where there had previously been local control (e.g., New Zealand). Hence, where previously there had been discrete subjects named in the curriculum, these are now organised into areas of learning, with the content described more lightly, and with a signal towards more integrated teaching, for example, 'The World Around Us' (History, Geography, Science) for primary education in Northern Ireland and integrated environment studies for primary education in Finland. Finland also requires a compulsory interdisciplinary module each year for all grades. Northern Ireland at Key Stage 3 (post-primary) organises all subjects around common key elements, designed to encourage cross-curricular learning but without making interdisciplinary learning compulsory as in Finland. Also, there are examples of new subjects named that are often specific to the cultural context, e.g., personal development and mutual understanding (Northern Ireland); character and citizenship education (Singapore); and content-related cross-curricular priorities such as knowledge of Aboriginal and Torres Strait Peoples and their Histories (Victoria).

Two examples go beyond these moves and introduce a more radical curriculum organisation around concepts – a concept-based curriculum (Erickson, 2002). As well as the key competency framework that applies across all subjects, British Columbia have identified 'big ideas' for each grade related to subject learning, as well as subject specific curricular competences (not dissimilar to subject skills).

The IB PYP exemplifies another version of a concept-based curriculum, where the SAME high level concepts (form, function, causation, change, connection, perspective, responsibility and reflection) drive curriculum design which is organised around themed units of inquiry (6 inquiry units are completed per grade). These are supported by several skills framework. The PYP predates the current wave of key competency frameworks and uses different terminology. Its distinctiveness is more associated with being a concept-based and an inquiry-led programme, with the overarching key competencies being captured in the IB learner profile which is common to all IB programmes.

In terms of whether these 7 country frameworks are full blown examples of competency-based curricula compared to subject- or disciplinary-based, the answer is probably no. All the curriculum

frameworks continue to explicitly describe and require either areas of learning or discrete subjects, and most continue to have achievement standards/outcomes related to those subjects (though Northern Ireland outcomes at Key Stage 3 are described in common-skills oriented terms). So the best estimate is that they are hybrid models. The one that stands out as different is the IB Primary Years Programme with transdisciplinary themes and units. But even PYP teachers use subject-based scope and sequence documents from which they plan their units.

Another way to examine the priorities in the country curriculum frameworks is to see what are the curriculum aims and values as explicitly stated in their curriculum documents. Reiss & White (2014) draw a distinction between possible starting points for curriculum design – between starting with the overall aims and goals of the curriculum and then settling on how knowledge domains will be organised, rather than beginning with the subjects. Aims-based curricula generally characterise the qualities of the student they would like to see enhanced as a consequence of schooling. All the country frameworks that were sampled have explicitly stated their aims in terms of expected student qualities when leaving school (e.g., educated citizen, informed and responsible decision-makers, lifelong learners, active citizens, confident persons, etc.), so the aims are consistent with the intentions of the key competency frameworks. My estimate is that there is still considerable tension both in curriculum design and curriculum implementation between the curriculum as intended in the curriculum frameworks and documents, and how it is designed and implemented in schools and classrooms.

The final question about **how an appropriate balance between the acquisition of knowledge and the development of competences can be supported** will be addressed in the final section on curriculum design, development and implementation.

6.5 Are particular competences emphasised at certain stages of the primary curriculum or is it the same throughout the primary years?

With the exception of the IB's Primary Years Programme, the other country frameworks are designed to apply to BOTH primary and secondary educational stages, with some applying to children as young as 4 years of age, where statutory schooling starts early (Northern Ireland, 4 years 2 months) and most stretching to cover the senior levels of secondary school. Thus, the key competencies identified as worth developing are deemed to be similar across ages and stages of schooling.

Unlike early years education where there has been considerable discussion about its distinctiveness in terms of a developmentally appropriate curriculum and pedagogy, there has been little or no discussion in the competency/curriculum design literature on whether certain key competencies should be prioritised for development in primary school compared to secondary school students (or for different phases of primary). However, it should be remembered that key competencies are intended to be developed in the context of ongoing classroom lessons and tasks that would be typical in primary school learning, so the primary focus is implicit. More generally, although some of the language of key competencies can seem very 'adult', there are plenty of examples of junior versions, in terms of expected profiles for grades, learning continua, and progression maps, so there are developmental expectations.

As well, the importance of early intervention does need to be re-stated. For example, since the dispositional components related to learning (positive and negative) are likely to develop early in a child's learning history, early intervention is likely to be more successful when those dispositions are more open to change than perhaps later on. This is simply rehearsing the general line of reasoning about the importance of early years learning - extended to primary schooling.

7 Linking Key Competencies with Aistear Themes and Junior Cycle Key Skills

Table 5 shows how meaningful connections might be made between a key competency framework at the primary phase, and children's previous learning through Aistear, and their future learning through Junior Cycle Key Skills.

The middle column in the table represents the key competency categories previously proposed – cognitive, interpersonal, intrapersonal, and the collection of learnings under the label Bigger Picture. The category Literacies is also included for completeness. The Themes and Aims of the Aistear Framework were then mapped onto these competency categories. Note that the alignment was more successfully achieved at the level of Aims rather than Themes. There was direct alignment between the Aistear Exploring and Thinking and Cognitive Competency not only for cognitive skills but also for dispositions. The aims associated with Identity and Belonging were more dispersed across competency categories but nevertheless there was reasonably good fit. Identity and Belonging – with its emphasis on group and community identity, life stories, rights and assertions, mapped well to the types of broader learnings identified under the Bigger Picture label. The developmental shift, from oral language and the beginnings of writing in Aistear to reading and writing in primary school, is obvious in the Literacies category.

Turning attention to the Junior Cycle Key Skills, the skills mapped easily to the cognitive, interpersonal and intrapersonal competency categories. Although the word 'disposition' is not explicitly used (as far as I could find), several of the details under the main skills headings refer to dispositions, attitudes or values (as previously defined), for example, being curious, being responsible, respecting difference, being positive about learning, and so on. What is missing from the Junior Cycle Skills framework is any reference to broader learnings such as citizenship, global awareness, intercultural understanding, etc. Of course these types of learning may be addressed in other parts of the Junior Cycle Curriculum.

The interrogation and mapping of the frameworks in this way has proved useful not only in identifying transition pathways and continuities but also in pointing out gaps as well as different uses of terminology.

Table 5 Linking Key Competencies with Aistear Themes and Junior Cycle Key Skills

Aistear Framework: Themes and Aims	Classification of Key Competencies	Junior Cycle Key Skills
Exploring and Thinking Making sense, observing, questioning, investigating, understanding, problem-solving. Positive dispositions, curiosity, playfulness, perseverance, risk-taking.	**Cognitive**, including higher order reasoning, critical thinking, creativity and inventiveness, problem solving, information processing and retrieval. Dispositions and values such as open-mindedness, curiosity, perseverance, and the desire to seek out challenges, and be well informed.	**Managing information and thinking –** being curious; gathering, recording and evaluating information and data; thinking creatively and critically; reflecting on and evaluating learning. **Being Creative –** imagining; exploring options and alternatives; implementing ideas and taking actions, learning creatively.
Communicating Non-verbal communication; language; creative expression. **Identity and Belonging** Expression of rights and understanding of rights/views of others.	**Interpersonal**, including working with others, respecting others, communication, negotiating and influencing, managing and resolving conflicts. Dispositions and values such as being respectful, wanting to be understood, being reliable and responsible.	**Working with others –** developing relationships and dealing with conflict; co-operating; respecting difference; contributing; learning with others. **Communication –** using language; using number; listening and expressing; performing and presenting; discussing and debating.
Well-Being Being strong psychologically and socially, fit and healthy, creative and spiritual, positive outlook on learning and on life. **Identity and Belonging** Strong self-identity, seeing themselves as capable learners.	**Intrapersonal,** including self – management of emotions as well as learning, self-regulation, personal flexibility, resilience, knowing strengths and weaknesses, plus the desire to improve, making and effort, believing in self-efficacy, learner agency.	**Managing myself –** knowing myself; making considered decisions; setting and achieving personal goals; being able to reflect on my learning. **Staying safe –** being healthy and physically active; being social; being safe; being spiritual; being confident; being positive about learning; being responsible, safe and ethically using technology.
Identity and Belonging Group and community identity, life stories, expression of rights and understanding of rights/views of others.	**Bigger Picture**, participating and contributing in a broader sense, citizenship, global awareness, awareness of economic and environment sustainability.	
Literacies		
Non-verbal communication; Oral language; Mark-making, recognising symbols, representing and expressing meaning through symbols.	Literacy; Numeracy; Digital.	Being Literate; Being Numerate; Digital Technology mentioned across all the above skills.

8 Curriculum design, development and implementation: What are the implications of a key competency approach?

It is well recognised that curriculum covers a continuum from the intended/designed curriculum, through the taught curriculum, the experienced curriculum, and the assessed curriculum, with the risk of gaps and discontinuities rather than enrichments occurring at each stage. The same issues arise with regard to key competency curriculum frameworks. Only a few of those can be highlighted in this report. For a more extensive treatment of transforming teaching, learning and assessment in a competency-based curriculum prepared by the International Bureau of Education, see Marope, Griffin & Gallagher (2017b). Note also that the second phase of the OECD's Future of Education and Skills 2030 project from 2019 will focus on creating guiding principles for the effective implementation of intended curricula (OECD, 2018, flyer).

Gallagher, Hipkins and Zohar (2012) present a useful comparison of the issues associated with positioning thinking in national curricula in Northern Ireland, New Zealand and Israel.

8. 1 Curriculum design

An important question with regard to the design of a key competency approach is where to position such a framework within the overall curriculum documentation and guidance. Reid (2006) provides a useful critique, drawing on his previous experience of skills-oriented curriculum reforms in Australia and elsewhere, for example, essential learnings (Southern Australia), essential skills (New Zealand), and key skills (England). He argues that the failure of these previous reforms to have a serious impact on the curriculum and student learning was because the approach adopted was not a sufficient departure from what had gone before – essentially, a school subject-based curriculum. He identifies three different models and their limitations.

The Name and Hope Model: In this model, the official documents name the desired key competencies and exhort teachers to pick them up in their subject teaching. Beyond that, there is very little advice as on how they might be linked to subject teaching, how they might be taught or indeed assessed. They remain as broad aspirations for subject teaching.

The Consciousness Raising Model: This model is a step beyond *Name and Hope*. Teachers are asked to be conscious of the key competences as they design their curriculum units and to spot opportunities for teaching it. A related version is to see the development of key competencies as a pedagogical option rather than curriculum goal in its own right.

The Embedded Model: In this model, the key competencies are embedded *within the subjects* or learning areas with guidance on where each might be best developed within the subject, but with no links or pointers *across subjects*. While at first sight this might seem like a good approach, the risk is that the key competency becomes invisible or marginalised in the face of subject teaching imperatives. In addition, the key competencies become fragmented across the subjects and lose their transversal and overarching intention (see Section 3 on the role of metacognitive teaching in realising the transversal nature of key competencies).

In giving advice to New Zealand in 2006, Reid recommends that these lessons should be learned - and they are likely to apply equally to other educational systems about to embark on a key competency journey.

Instead of any of the above models, he advises that, as a starting point, the curriculum should be considered as consisting of two parts – the key competencies and content knowledge (however organised). These two parts have distinctive yet complementary roles. The idea, he says, is "to teach through one part – knowledge – in order to develop the second part – key competencies" (p.11), what he called teaching through knowledge FOR capabilities (his word). In the dynamic interaction between the two parts, sometimes the content will provide the starting point and sometimes the key competence will provide it. So the teacher is selecting content not just for the importance in its own right but as an opportunity for competency development. This is likely to have consequences for how a unit/task is designed, how it is taught, and for how it is assessed, with an emphasis on competency growth as well as on a deeper understanding of the topic, and/or on knowledge building.

Of course, one of the fears of this approach is that the curriculum will become inverted – as Perkins (2014) described it - with Big Know-How (his terminology for key competencies) displacing knowledge. In reply, Perkins favours the view that key competences cannot be learned in a vacuum; for example, you cannot practice thinking without having something substantial to think about or develop civic awareness without knowing or finding out how civic life is organised. Nevertheless, he does point out that some serious choices do need to be made to get the balance right and that curriculum designers/schools/ teachers should not shy away from those choices. He concludes that, if key competences are taken seriously, then the curriculum should be "shaken and stirred "(p.220) in the sense of being recalibrated for the "lives learners are likely to lead" (p.220). The implication is that learners need to know how to build knowledge, and to apply knowledge, as well as to learn about established knowledge.

From the previous section comparing the country frameworks, note how different countries managed the balance between their competency frameworks and knowledge organisation, at least at the design stage.

8.2 Curriculum Development

The previous analysis of the meaning of key competencies, as well as the balance argument just outlined, shows that helping schools/teachers/learners get this right will not necessarily be straightforward. Curriculum authorities who have moved in this direction have put considerable effort into creating, and co-creating with teachers, guidance and explanations of frameworks, versions for ages and stages, case studies (narrative accounts and videos) of 'what it looks like in my classroom', as well as progress maps and learning continua to understand competency growth and so on. A useful summary of what curriculum developments might be needed for a competency approach comes from an International Bureau of Education's document (Kapita & Ji, 2017) reporting the Kenyan experience of moving in this direction,

I have added some additional comments (in italics) from my own experience of working with the Curriculum Council for Examinations and Assessments (CCEA) in Northern Ireland prior to the roll-out of their Thinking Skills and Personal Capabilities Framework in 2007, and from my research on other country frameworks. Some of the key elements are:

- Developing competency descriptors for each of the desired key competencies; *and describing how the key competencies work together as a coherent whole;*
- Developing descriptors for different levels/ages and stages*; plus articulating the underlying principles of progression between them. Not all frameworks take this position, for example, New Zealand worked more from case studies of what it looks like in my class rather than from explicit level descriptors.*
- Developing suggested learning experiences that promote the achievement of the descriptors;
- Developing key inquiry questions that promote inquiry-based teaching to help differentiated instruction*. This is not typical in all countries, although most have worked with schools to create specific tasks and units.*
- Developing assessment rubrics for formative assessment at least, and also for summative assessment;
- *Developing materials for children with specials need;*

- *Designing a BIG PICTURE of the curriculum, showing how the different elements work together for ease of communication and ready reference.*
- *Clarifying about how the key competencies can be identified and represented in subjects so that teachers can confidently recognise and highlight their transversal value to students, as well as opportunities to apply key competences in a range of contexts. (See below for an elaboration of this point.)*

For examples of these developments from the country frameworks, see

Northern Ireland: This website gives access to the Thinking Skills and Personal Capabilities framework and all the associated resources.
http://ccea.org.uk/curriculum/key_stage_1_2/skills_and_capabilities/thinking_skills_and_personal_capabilities

New Zealand: This website gives access to key competencies resources.

http://nzcurriculum.tki.org.nz/Key-competencies

British Columbia: This link accesses a specific webpage on how creativity is profiled with illustrations for different grade levels.

https://curriculum.gov.bc.ca/competencies/creative_thinking

Victoria, Australia: This link accesses a specific webpage where critical and creative thinking is profiled and shows how progression is demonstrated through learning continua.

http://victoriancurriculum.vcaa.vic.edu.au/critical-and-creative-thinking/introduction/scope-and-sequence

In the development phase, it is important to make a connection between what is currently mapped out for the subjects (probably knowledge and skills) and the new key competency descriptors, at least to identify where the gaps are. Subject skills are likely to align with cognitive components of a competency framework, at least with regard to 'thinking', while there are likely to be gaps with regard to explicit reference to dispositions/attitudes and values, even in the cognitive domain. Interpersonal and intrapersonal competences tend not to have strong subject specific profiles and an audit of current subjects is likely to reveal the bigger gaps.

The Kenyans have set up subject panels to develop key competency learning outcomes that focus on knowledge, skill, attitudes and values related to meaningful learning in each subject. The risk here is the one outlined by Reid re the 'embedded curriculum model' which is that, once identified within

subjects, the overarching key competencies 'get lost'. In order to avoid this, it will be important to keep the subject perspective in constant dialogue with the overarching key competency framework, in the way articulated by Reid's notion of teaching through knowledge for competencies. Also, teaching through existing subjects may not be sufficient to allow the key competencies to be fully achieved, pointing to new areas of knowledge that need to be added to the curriculum mix, or that a shift to transdisciplinary approaches (e.g., for citizenship, global awareness) or a more integrated teaching approach may be appropriate.

8.3 Curriculum Implementation

Curriculum reform and renewal is now considered to be a mixture of top down and bottom processes, involving not only key curriculum actors – curriculum authorities, schools, teachers and learners, but also parents, school governors, unions, national education policy-makers, as well as other community stakeholders viewed as 'external' to schools (e.g., health boards, sports clubs). Communicating and engaging these stakeholders on the direction of curriculum change will be vital (especially parents). Beyond that, there are some implementation imperatives that are specifically important for a key competency approach to the curriculum.

Curriculum Alignment: Key competency frameworks introduce new goals for learning and new considerations of how they should be taught and assessed are needed. This foregrounds the question of curriculum alignment – the consistency or coherence between curriculum goals, pedagogical practices, assessment (both formative and summative) and, crucially, national examinations. A full treatment of the topic is beyond the scope this section but there is a need to think through both pedagogical, assessment and examinations' implications, and also accountability – on what basis will schools and teachers be held to account and against what measures.

Suffice to say that a competency curriculum perspective is about developing and teaching know-how in its broadest sense. Know-how needs to be modelled by the teacher, and practiced by the students who need relevant feedback and opportunities for improvement – that's the learning trajectory for know-how, so explanation-based teaching, however good, will not be sufficient. Also, tasks need to be sufficiently challenging and authentic to allow De Corte's type of effective learning strategies to emerge (using knowledge flexibly, using heuristics and thinking aids, collaboration on tasks, allowing self-monitoring and feelings of mastery). Finally, assessment needs to be at least congruent with the formative goals normally associated with key competency development. There is now a considerable amount of practitioner guidance available re the assessment of key competencies, see Guidance for Educators, produced by the Asia Society and the Global Cities

Education Network (Soland et al., 2013) and a very thoughtful piece by Hipkins (2007) on assessing key competences in the context of the roll out of the Key Competencies in New Zealand.

Shifting mind-sets about the nature of learning and teaching: It is likely that some schools and teachers will begin their journey to a competency-based perspective from different starting points. Some may have previous experiences of a skills-oriented approach and have positive or negative views about it ("we have tried this before and it didn't work" or "we already do that"). Primary school teachers are probably better placed to embrace this kind of change than secondary teachers as they are more accustomed to adopting an across-the-curriculum approach through having responsibility for 'whole child' development, and through teaching literacy and numeracy. Nevertheless, the kind of learner agency and knowledge-building envisaged through key competency development may be a radical departure for most teachers. In monitoring the roll-out of the Scottish Curriculum for Excellence, which is a "capacities" curriculum not dissimilar to those discussed in this paper, Priestly and Minty (2013) interviewed primary and secondary teachers about their experiences of teaching the new curriculum and their reactions so far. They noted two levels of engagement. At the first level, teachers were enthusiastic about it and felt that it was consistent with their views on education, they thought the four capacities were great "hooks" for engaging students and so on. But going deeper to a second level, Priestly and Minty noted that the philosophy of the curriculum was often at odds with the implicit, and previously unarticulated, views that some teachers had about the nature learning – largely transmission views – and these got in the way of developing newer teaching practices. They recommend giving teachers time to fully engage with the philosophy and expectations of a new curriculum – a deeper form of teacher engagement than perhaps often happens with curriculum roll-out. In our work in Northern Ireland, introducing a play-based early years' curriculum, we found that teachers' implicit theories and mental models of early years' practice yielded quite different interpretations of intended pedagogical changes (Sproule, 2017).

The need to monitor implementation: Because of the likely discontinuities between the curriculum as designed, and the capacity of schools/teachers/students to embrace a reformed curriculum, it is imperative to systematically monitor the implementation phase. For example, the New Zealand Council for Educational Research (NZCER), in partnership with their Ministry of Education, studied 25 case study schools as part of their curriculum implementation phase, monitoring all aspects of their new curriculum, not just key competencies. However, particular attention was paid to how key competencies were received, and the report noted how schools began to interact with the

competencies, for example, deciding perhaps to engage with one of the competencies that was most connected to their previous pedagogy – working with others, participating and contributing (New Zealand Ministry of Education, 2009). Our experience of the roll-out of the Thinking Skills and Personal Capabilities in Northern Ireland mirrors that experience. While this looks like a sensible 'first step in the water' approach, there is a risk that a key competency framework can become fragmented and that opportunities are missed to create synergies between the competencies, for example, that working together (e.g., cooperating, listening, turn-taking, responding to disagreements) on a challenging task is likely to involve thinking (e.g., problem-solving) as well as a degree on self-management by individual pupils (e.g., perseverance, taking responsibility, monitoring their contributions) together with managing how the group is getting on with the task.

There is also merit in continuing to monitor the implementation of the curriculum over a more extended period of time, noting what happens as the curriculum 'beds' in, and teachers begin to seize opportunities afforded by the reformed curriculum and to take it forward creatively. For example, as part of its regular surveys of schools, New Zealand has continued to see how schools and teachers are making sense of key competences, associated pedagogies and classroom talk (Hipkins, 2015), and how contradictions between different parts of the school system (e.g., assessment and attainment targets) can create tensions and barriers. It is important to have mechanisms for feeding back such findings to all schools, and to create communities of practice between teachers and between schools, as a renewed curriculum is rolled out.

9 Conclusions and final comments

9.1 Key competency development can be seen as part of a more general thrust in educational systems across the world to pursue broader learning goals beyond traditional school subjects. The aim is to improve student learning in preparation for 2lst century living and 2lst century work.

9.2 While the terms skills and competencies are often used interchangeably, they have different meanings. Key competency is a broad concept and encompasses skills, dispositions, attitudes and values, as well as knowledge about the context in which the competency is learned and demonstrated. A key competency is a learner's capacity to act in response to the demands of a more complex situation or task. To do so successfully, the learner needs to be appropriately informed about the task (have prior knowledge), and to deploy cognitive and social skills, dispositions and values to meet the demands of the task. A competency is 'key' because it is useful across a range of learning contexts and situations. The term 'transversal' - in the sense of intersection – is increasingly used to capture a similar meaning.

9.3. Contemporary studies of school learning demonstrate that there is more to effective learning than acquiring a well-organised knowledge base. Effective learners also need more general strategies and thinking plans to help them with new learning; they must be able to motivate and self-regulate their learning in order to respond flexibly to new problems, and have positive beliefs and attitudes about themselves as learners. This more agentic view of learning is entirely consistent with key competency development and positions key competencies as crucial to help the transfer of learning, provided they are taught with transfer in mind.

9.4 There is broad agreement across both international and national curriculum frameworks about the scope of 2lst century competencies, although they may have different names, for example, thinking skills and capabilities (Northern Ireland), key competencies (New Zealand), 2lst century competencies (Singapore), general capabilities (Victoria, Australia), core competencies (British Columbia, Canada), and transversal competences (Finland).

9.5 Drawing on international frameworks and research-based sources, a classification for key competencies is proposed that includes five categories with different points of reference. Remembering that competencies include skills, dispositions, attitudes and values, as well as knowledge of context, the first three – Cognitive, Interpersonal and Intrapersonal – have largely a PERSONAL point of reference. The next category, labelled Bigger Picture, includes a range of different types of learning, such as global awareness, citizenship, intercultural understanding, sustainability education, requiring transdisciplinary knowledge and understanding – refer largely to

the nature of the CHALLENGE, and the final category, commonly called Literacies – reading and writing, numeracy, digital, media – refer largely to the nature of the TOOL being used.

9.6 Key competency frameworks were closely examined from the 7 educational jurisdictions named in point 9.4, with regard to the balance between knowledge and key competencies. For the most part, key competency frameworks are introduced as part of a more general curriculum reform motivated by the need to reduce the prescribed content and to introduce more flexibility into their national curricula. Different solutions about knowledge organisation are adopted – moving from discrete subjects to areas of learning; lighter specification of content; more integrated learning; cross-curricular themes and priorities, as well as a more deliberate focus on a concept-based curriculum as well as a competency- based curriculum. These curriculum solutions can be characterised as hybrid, as many continue to have achievement standards/outcomes related to subjects, though a few have outcomes framed in key competency terms within subjects as well.

9.7 For the competency frameworks that were analysed, no one competency or subset of competencies was/were identified as specific to primary schooling. Essentially, the same competencies are judged as appropriate for development across all ages and stages of schooling, from early years through senior phases of secondary school. However, age/grade related profiles exemplify developmental expectations, and various progress maps and learning continua indicate expected growth and development. However, a more integrated approach to knowledge organisation is more evident in primary school than in later phases, but not in all cases.

9.8 In order to examine continuity and transitions between different phases in the curriculum, the Aistear Early Years' Framework and the Junior Cycle Key Skills were mapped against the proposed key competency framework. Transition pathways are very clear, with differences in terminology and some small gaps noted. The concept of well-being is more prominent in the Aistear framework than in the others, and there is no mention of the Bigger Picture challenges in the Junior Cycle Key Skills, perhaps not surprising, as they are not usually conceptualised as 'skills' .

9.9 With regard to any desired broader learning goals that are not included, or not so prominently included, in the framework analyses , children's social-emotional development is clearly present but rather hidden in the Interpersonal and Intrapersonal competency categories, and perhaps needs clearer articulation to link it to any other on-going personal and social development education in schools. Also, health and physical education is largely absent as a key competency but is perhaps included in other areas of the curriculum as a subjects in their own right. Finally, the concept of

well-being is not yet receiving high prominence in competency frameworks, though recent developments for OECD Learning Framework 2030 show that this is changing (OECD, 2018).

9.10 The issues related to curriculum design, curriculum development and curriculum implementation are only briefly dealt with in this report and deserve more extensive exploration and analyses, perhaps in a separate paper. A key issue identified for curriculum design is where to position the development of key competencies in relation to subject learning. The importance of maintaining the visibility of key competencies within subjects and in making connections across subjects is emphasised, if the transversal impact of competencies is to be realised. Another important issue identified is alignment and consistency between these newer learning goals, pedagogy and assessment practices, not only in classrooms and schools but also for public examinations, school inspections, etc. There is a need to invest substantial effort and resource into creating, and co-creating with teachers, sufficiently detailed descriptions of the meaning of each key competency so that teachers can know 'what it looks like' in their classrooms, and for formative assessment. The importance of shifting mind-sets about the images of teaching and learning (learner agency) implied by key competency development should not be underestimated. Finally, from the experience of other jurisdictions involved in similar curriculum implementations, it is important to systematically monitor the roll-out, so that adjustments can be made while ensuring that the overall curriculum vision and intention remains on track.

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11 Appendices

Appendix 1

Key questions from the specification

The following questions frame the research informed analysis on skills and dispositions which are important for children's learning and development in a redeveloped primary curriculum.

1 What is a useful, functional definition of competences in the context of primary school curricula?
2. What is the purpose and justification for including overarching competences in a primary curriculum?
3. What is the relationship between key competences and effective learning?
4. In light of international trends, literature and priorities; what are the overarching competences being foregrounded in primary curricula in 8 different jurisdictions as comparators to Ireland?
5. How can a primary curriculum support an appropriate balance between the acquisition of knowledge and the development of interconnected, interrelated competences?
    a. What is the balance between balance between competences and knowledge in primary curricula?
    b. Do the competences form the basis of primary curricula?
6. Should there be an emphasis on the development of particular competences in a certain stage(s) of a primary curriculum or is it more beneficial if the same overarching competences are present throughout all stages of a primary curriculum?
7. How can overarching competences in a primary curriculum make meaningful, tangible connections with curriculum frameworks for children's previous and future learning through *Aistear* and lower secondary education[2]?

[2] *Aistear* sets out learning and development goals for all children from birth to six years and focuses on dispositions, values and attitudes, skills, knowledge and understanding. The Framework defines dispositions as enduring habits of mind and action and states that a *disposition is the tendency to respond to situations in characteristic ways* (NCCA, 2009a, 54). In particular, it advocates the nurturing of dispositions like independence, resilience and resourcefulness. At the other end of primary education Junior Cycle sets out key skills for young people. These are being literate, managing self, staying well, managing information and thinking, being numerate, being creative, working with others and communicating.

8. What are the implications of this research informed analysis for curriculum design, curriculum development and curriculum implementation?