

**DIRECTORATE FOR EDUCATION AND SKILLS  
EDUCATION POLICY COMMITTEE**

**THE EDUCATION 2030 CONCEPTUAL LEARNING FRAMEWORK AS A TOOL TO BUILD  
COMMON UNDERSTANDING OF COMPLEX CONCEPTS**

**4th Informal Working Group (IWG) on the Future of Education and Skills: OECD Education 2030**

**9-10 November 2016  
Beijing, China**

*This paper includes contributions by experts from different disciplines, institutions and regions of the world to decompose and reconceptualise complex concepts relevant for 2030 into knowledge, skills, attitudes and values by using the OECD Education 2030 Conceptual Learning Framework's taxonomy.*

*Participants are invited to*

- *DISCUSS* the different/complex concepts and how they can be decomposed using the E2030 taxonomy
- *SUGGEST* a selection of key constructs for each complex concept according to each guiding principle (relevant, impactful, malleable, measurable)
- *SUGGEST* possible ways to use the E2030 framework (including the taxonomy) in their respective work

Miho TAGUMA, Senior Analyst; E-mail: [miho.taguma@oecd.org](mailto:miho.taguma@oecd.org); tel.: +33-1 45 24 92 65  
Katja ANGER, Research Project Coordinator; E-mail: [katja.anger@oecd.org](mailto:katja.anger@oecd.org); tel.: +33-1 71 37 42 37

**JT03404507**

Complete document available on OLIS in its original format

*This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.*

## TABLE OF CONTENTS

Introduction	3
Using the Education 2030 Learning Framework to decompose complex concepts	5
1. Global Citizenship/ Global Competence	5
A) Global Citizenship - Ms Connie Chung, Associate Director, Global Education Innovation Initiative & Lecturer, Harvard Graduate School of Education	6
B) Global Citizenship - UNESCO Section of Education for Sustainable Development and Global Citizenship	12
C) Global Citizenship - Competences for Democratic Culture: Mr Calin Rus, Expert, Council of Europe	14
D) Global Aspects of Civic and Citizenship Education - Inter-national Association for the Evaluation of Educational Achievement (IEA) International Civic and Citizenship Study (ICCS)	20
E) Global Competence - OECD PISA	24
2. Foresight - Mr Peter Bishop, Teach the Future	28
3. Education for Sustainable Development (UN SDG 4.7) - UNESCO Section of Education for Sustainable Development and Global Citizenship	39
4. Innovation	42
A) Mr Guillermo José Aguirre-Esponda, Grupo Aguirre – Innovalia	42
B) Mr Horii Hideyuki, iSchool, Tokyo University	49
5. Computational thinking/Programming/Coding - Ms Anja Balanskat, European Schoolnet	52
6. Financial Literacy - Ms Chiara Monticone, OECD Directorate for Financial and Enterprise Affairs	63
7. Student Well-being - Mr Alejandro Adler and Mr Martin Seligman, University of Pennsylvania	71
ANNEX I - REFERENCES	78

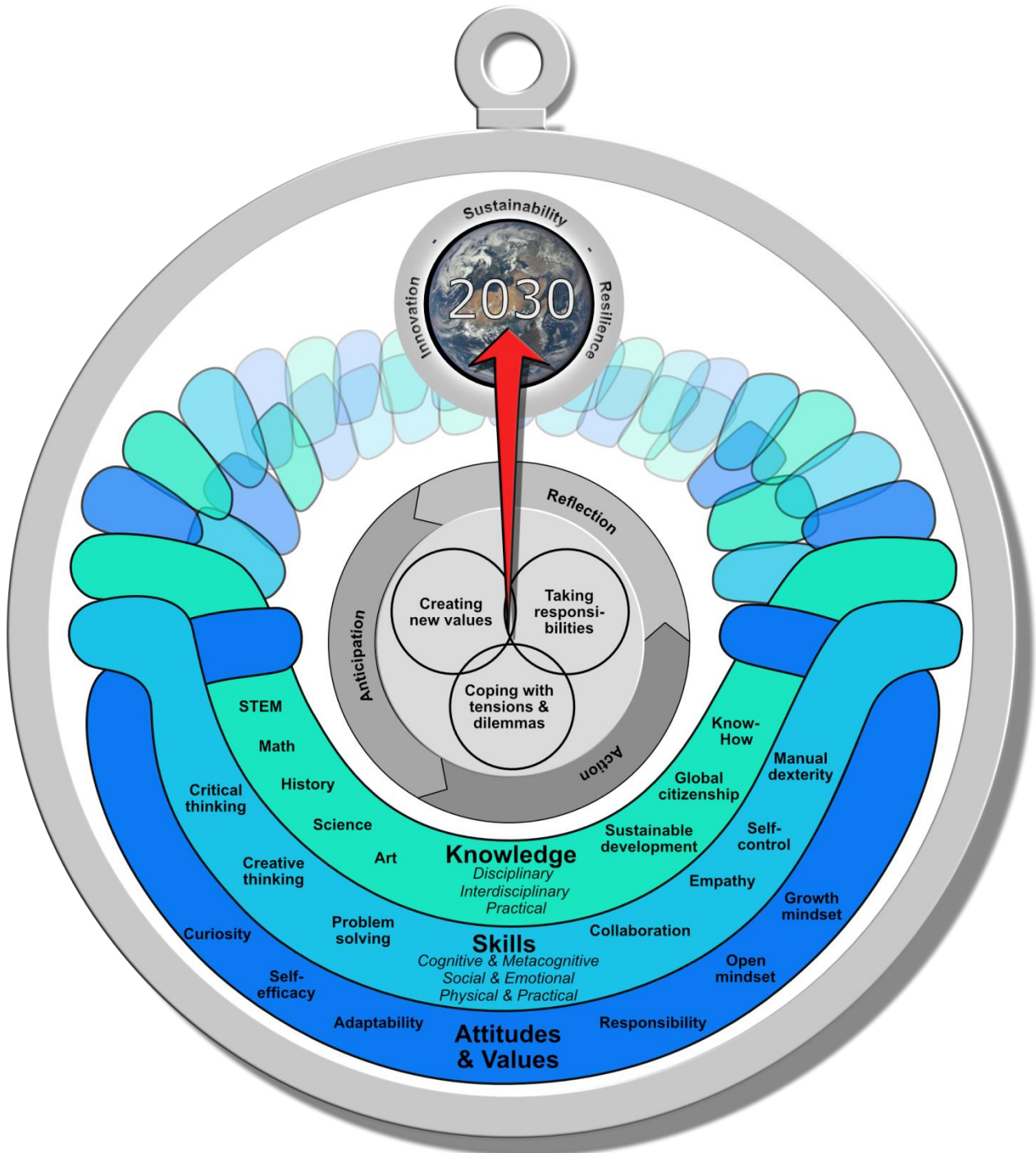
## Introduction

1. Over the course of time and to adjust to changes in society, new concepts emerge that are considered to be of key importance for students to learn in schools. Currently some of these emergent concepts are global competence/global citizenship, financial literacy, foresight, innovation, etc. However, integrating these new concepts into the teaching and learning can be challenging due to their multi-dimensional nature and complexity.

2. 4. Education systems are primarily organised around subject disciplines and it is not always clear cut through which discipline/subject such a concept should be taught or, if an inter-disciplinary approach is chosen, which aspects of the concept should be taught through which subjects (i.e. how to ensure an integrated curriculum). This oftentimes poses challenges, for example, to curriculum designers on how to integrate such concepts into the curriculum and /or guidelines, i.e. as a new subject (leading to curriculum overload) or how to embed them within subjects (i.e. conceptual complexity). Similarly, teachers are challenged to embed these new concepts in their teaching and are oftentimes lacking adequate support to develop a deeper understanding of the concepts and how they can most effectively embed them into their teaching.

3. *The Future of Education and Skills: Education 2030* conceptual learning framework (see Figure 1) is being developed to outline the relevant knowledge, skills, attitudes and values that young people need to acquire in order to understand, engage with and shape a fast-changing world. The framework is also intended to serve as an overarching taxonomy that can be used to deconstruct new demands/concepts that emerge over time on teaching and learning, such as financial literacy, global competence, student well-being, etc. to make it easier, for example, for curriculum designers to provide clear guidance to practitioners or for teachers to gain a deep understanding of the concepts and to be able to foster, at least aspects of them, effectively through the subject-discipline they are teaching.

Figure 1. The Education 2030 Learning Framework



### Using the Education 2030 Learning Framework to decompose complex concepts

4. The following sections will show how the Education 2030 Learning framework's taxonomy can be used to decompose the concepts of

- **Global Citizenship/ Global Competence**
- **Foresight**
- **Education for Sustainable Development**
- **Innovation**
- **Computational thinking/Programming/Coding**
- **Financial literacy**
- **Student well-being**

5. In addition, each concept will be assessed according to the guiding principles for the framework development and show why the proposed taxonomy is helpful for curriculum redesign, implementation and assessment:

- a) **Relevant towards 2030** - likely to support today's students to live successfully and shape the 2030 world;
- b) **Impactful** - proven (or thought capable of being proven) to have a significant bearing on their future life outcomes – including e.g. better education outcomes, employment, participation in social life, etc.;
- c) **Malleable** - can be developed through the processes of learning – focusing on students in secondary education but please consider age appropriateness, if research exists, for children in early years or primary schooling;
- d) **Measurable** - can be given (or thought capable of being given) a comparative numerical value on a scale, or in other means.

#### *1. Global Citizenship/ Global Competence*

6. The following sections look at global citizenship/ global competence from different institutional and research perspectives, aiming to create greater conceptual clarity of existing frameworks or attempts to define global citizenship and what it is constituted of:

**A) Global Citizenship - Ms Connie Chung, Associate Director, Global Education Innovation Initiative & Lecturer, Harvard Graduate School of Education**

Knowledge			Skills			Attitudes & Values
Disciplinary / learning areas	Inter-disciplinary / cross curricular	Practical	Cognitive & meta-cognitive	Social & emotional	Physical & practical	
<p><i>Constructs</i></p> <p><b>Foreign Language</b> - Proficiency in at least one language in addition to one’s mother tongue, including the intercultural skills associated with knowing how to speak the language in a culturally respectful and appropriate manner (OECD, 2016)</p> <p><b>Social Studies/ Government</b> - Knowledge of students’ own country’s role in global affairs, including relationships with other countries, in politics, economics, and culture - Knowledge of major international institutions and their roles in shaping global affairs (Reimers et al, 2016)</p> <p><b>Social Studies/ History</b> - Knowledge of world history and geography, with attention to the role of migration and globalization</p>	<p><i>Constructs</i></p> <p>- Knowledge about the qualities – history, languages, geography, and cultural contributions – of peoples the world over, with a particular focus on the arts and culture as a way of learning about shared and diverse interests and values of different people (Horvathova, 2015).</p> <p>- Understand how cultures, communities, and contexts can shape one’s own and others’ identities, including ethnic, cultural, gender and sexual, political, faith, and relational identities (Nakkula &amp; Toshalis, 2006)</p> <p>- Knowledge about theories of economic and political development and how they explain the various stages in economic development of nations; understanding about the origins and solutions to</p>	<p><i>Constructs</i></p> <p>- Knowledge about how to access and evaluate the quality and integrity of information, facts, and resources about countries, regions, and cultures other than one’s own</p> <p>- Knowledge about effective, and appropriate ways and tools to communicate between cultures, and how to use these tools appropriately, including digital and media literacy</p> <p>- Knowledge about pressing global challenges and opportunities; what people, businesses, civil society, government, and</p>	<p><i>Constructs</i></p> <p>- Analyze and think critically in order to scrutinize and appraise information and meanings (OECD, 2016)</p> <p>- Meta-cognitive ability to think about issue X (climate change, for example) in ways that consider “multiple locations, perspectives, and concerns” of different groups and be able to communicate effectively about these various conditions</p>	<p><i>Constructs</i></p> <p>- Ability to adjust one’s thoughts, feelings or behaviors to fit new contexts and situations (OECD, 2016)</p> <p>- Demonstrate empathy toward people from different backgrounds, including different cultural, socio-economic, and religious backgrounds (CoE, 2016 &amp; OECD, 2016)</p> <p>- Intercultural social skills, such as the ability to interact with people from diverse cultural backgrounds,</p>	<p><i>Constructs</i></p> <p>- Ability to find, belong to, and sustain global and diverse community links, including virtual communities (digital media literacy and know the proper forms of behavior) (Haste, 2001)</p> <p>- Conflict resolution skills such as the ability to resolve culturally based disagreements through negotiation, mediation, and conflict resolution; the ability to recognize and weigh diverse cultural perspectives; the</p>	<p><i>Constructs</i></p> <p>- Attitude of openness towards and curiosity about other people, cultures, countries, and global affairs (OECD, 2016)</p> <p>- Attitude of respect for cultural otherness</p> <p>- Attitude of global mindedness (i.e. that one is a citizen of the world with commitments and obligations towards the planet and towards other people irrespective of their particular cultural or national background) (OECD, 2016)</p> <p>- Responsibility for one’s own actions.</p> <p>- Commitment to the basic dignity and equality of all people, regardless of gender,</p>

EDU/EDPC/RD(2016)38

<p>in cultural change, trade (Reimers et al, 2016)          - Knowledge about the role of human choice and decision-making in influencing the flow of national and global history          - Study of philosophical traditions, including world religions and knowledge about the diversity of viewpoints and conflicts that exist within single religions, and their malleability over time</p> <p><b>Social Studies/ Science</b>          - Knowledge about the role of human choice and decision-making in influencing the geography and the climate of the planet</p>	<p>poverty and inequality (Reimers, et al, 2016)          - Knowledge about examples of human, organizational, and governmental strategies and choices that have impacted local and global challenges and opportunities, including the opportunity to evaluate the short and long term impact of these choices          - Knowledge of ethical frameworks from different regions of the world, including the human rights framework and the history of the formation of the Universal Declaration of Human Rights (Reimers et al, 2016)</p>	<p>others are already doing about them; what else needs to and could be done; how local action can impact globally shared challenges          - Knowledge about the varieties of tools and strategies used to influence global organizations, the ability to discern and weigh the use of these strategies</p>	<p>(Horvathova, 2015; Deardorff, 2013, in OECD 2016)</p>	<p>including the ability to work productively in and effectively lead intercultural teams, and the ability to demonstrate courtesy, appreciation, and understanding of norms of interaction appropriate to various cultural settings (Reimers, et al, 2016)</p>	<p>ability to recognize and examine assumptions and prejudices when engaging with differences between groups and individuals (Reimers, et al, 2016)</p>	<p>religion, sexual orientation, culture, etc..          - Cultural humility (Deardorff, 2013, in OECD 2016)          - Respect (Deardorff, 2013, in OECD 2016)          - Integrity (Reimers, et al, 2016).          - Learn to manage well the tension between innovation and continuity; to “manage diversity and dissonance in a creative and coping way, and avoid premature closure, or dissolution into relativism” (Haste, 2001)</p>
---	---	--	--	---	---	--

## Introduction

7. The OECD (2016) document, “Global Competency for an Inclusive World,” states that “Global Competence is the capacity to analyse global and intercultural issues critically and from multiple perspectives, to understand how differences affect perceptions, judgments, and ideas of self and others, and to engage in open, appropriate and effective interactions with others from different backgrounds on the basis of a shared respect for human dignity.” The paper highlights that global trends are “complex and require careful investigation... and that global competence should equip young people not just to understand but to act.”

8. This concept note builds on and supports this and other existing documents about global citizenship education, such as the one published by the Council of Europe (2016), the Asia Society (Boix Mansilla & Jackson, 2010), International Civic and Citizenship Education Study, publications by UNESCO about SDG 4.7 on Global Citizenship, the paper written by Margaret Sinclair (2004) for UNESCO, and the paper written for the Directorate for Education and Skills, OECD, about globalization and social cohesion, in which Michaela Horvathova (2015) discusses major trends that are a consequence of our increasingly globalized world and how these changes are impacting the social cohesion of our societies.

## Global Citizenship through the lens of four principles

### *Relevant toward 2030*

9. Developing global citizenship competency is relevant to our world that is increasingly interdependent and characterized by VUCA – volatility, uncertainty, complexity, and ambiguity (Reimers & Chung, 2016). The UN’s Global Education First Initiative (2012) notes that “it is not enough for education to produce individuals who can read, write and count. Education must fully assume its central role in helping people to forge more just, peaceful, tolerant and inclusive societies”.

10. Global citizenship education (GCE) provides the knowledge, skills, attitudes, and values students need to cooperate in resolving the interconnected challenges of the 21st century, including not only preparing students to be successful in the 21<sup>st</sup> century workplace, but also address climate change, conflict, poverty, hunger, and issues of equity and sustainability (Menton, 2015). For example, NASA (2016) documents that while global sea levels rose about 17 cm (6.7 inches) in the last century, the last decade saw a rate of increase that was nearly double that of the last century; the amount of carbon dioxide absorbed by the upper layer of oceans is increasing by about 2 billion tons a year. According to UNESCO, we need to provide the kind of education that teaches people how to live together, instilling core skills, values, and attitudes that encourage respect for human rights, social justice, diversity, gender equality, and environmental sustainability (UNESCO Infographic, 2016).

11. Reimers (2013) writes that GCE “is... the new civics of the 21<sup>st</sup> century, because citizenship is embedded in a mesh of relationships that are global as well as local.” I add that these relationships are organizational, economic, political, and environmental, as well as personal. Reimers (ibid) also emphasizes that GCE should “not [be an] indoctrination into a particular set of beliefs or values”; I suggest that **by following the Education 2030 Learning Framework, GCE could be the framework for the set of knowledge, skills, attitudes, and values that would teach students to become independent individuals who can participate in the global commons, engaging them “with dilemmas and controversy that... have no singular solutions, but where awareness of different cultural perspectives” (Reimers, 2013; Haste, 2001) on these problems is necessary to finding the appropriate ways to solve them, such as the challenges outlined in the SDGs.**



***Impactful***

12. In the United States alone, one in five jobs are tied to international trade (Asia Society, 2016). Research is most robust in the area of studying the benefits of second language acquisition, which has been linked with better cognitive development, higher order thinking, and creativity (NEA, 2010). In addition, “students who have learned intercultural skills, understand multiple contexts and traditions, and have had multiple opportunities to reflect on their own world views in light of others’ are less likely to experience difference as a threat requiring violence defense. Rather they are more likely to experience the cultural encounter as an opportunity for exchange and collaboration” (Suarez-Orozco, 2008, in Boix Mansilla & Jackson, 2010).

13. Researchers have noted that global citizenship education curriculum encourages students to understand globalization, to adopt a self-critical approach to how they and their nation may contribute to local and global problems, to engage in intercultural perspectives (Pashby, 2008); and to recognize and use their political agency towards effecting change and promoting social and environmental justice (Eidoo et al, 2011)<sup>1</sup>.

14. Studies show that combining different kinds of knowledge, such as understanding the scientific phenomena involved in climate change, with why the environment matters, is part of an effective curriculum (OECD, 2009, in Horvathova, 2015). Further, research shows that an increase in knowledge about global issues – such as students’ awareness of environmental challenges – shapes attitudes and behaviours (OECD, 2013, in Horvathova, 2015).

***Malleable***

15. There are a few studies that look at different constructs under the broad umbrella of “global citizenship.” For example, a recent review of literature about the concept of “intercultural competence” (Leung et al, 2014) proposes that intercultural competencies can be classified based on traits, attitudes and worldviews, capabilities, or a combination of these dimensions. However, few studies exist that look at the malleability of “global citizenship” as a whole.

16. However, from the research literature about adolescent development, we know that adolescence is a particularly malleable period in youth (Steinburg, 2014), and a period when youth are exploring different aspects of their identity (Nakkula & Toshalis, 2006). As identity building relates to global citizenship education, Suarez-Orozco and Qin-Hilliard (2004, in Sussmuth, 2007), for example, write, “globalization threatens identities of both the original residents of the areas in which newcomers settle and those of the immigrants and their children.” They suggest that to “increase the benefits of globalization for our youth, schools must increasingly help youth ‘identity build’ and thus reduce their fears of diversity and increase their understanding of the global context in which they live” (Sussmuth, 2007).

17. Schurgurensky (2005, in Eidoo et al, 2011) observes that “transformative citizenship learning involves the nurturing of caring and critical citizens who raise important questions and problems in overt ways” and “probe the status quo.” Andreotti (2006) further draws the distinction between “soft” and “critical” GCE and looks to critical literacy for a pedagogical approach that “prioritizes critical reflection and asks learners to recognize their own context and their own and others’ epistemological and ontological assumptions”. Furthermore, she argues that in order “to think otherwise” and to transform views and relationships, learners must engage with their own and others’ perspectives. Andreotti’s ‘critical’ global citizenship model promotes citizenship action as “a choice of the individual after a careful analysis of the context of intervention, of different views, of power relations (especially the position of who is

---

<sup>1</sup> Please note that the author wrote this paragraph first for Reimers, et al (2016).

intervening) and of short and long term (positive and negative) implications of goals and strategies” (p. 7). Key concepts of critical GCE include transformation, criticality, self-reflexivity, diversity, complicity, and agency” (Eidoo et al, 2011)<sup>2</sup>.

### ***Measurable***

18. The OECD (2016) includes a review of cognitive assessments in this area and proposes that in PISA 2018, students’ capacity to apply their knowledge, perspective-taking, analytical and evaluation skills to tasks referring to relevant intercultural global issues would be evaluated.

19. UNESCO (2014)’s report on GCE notes that measurement of GCE can also be implemented in different ways, taking into consideration different aspects such as the “inputs (e.g. educators’ competencies, resources, tools, learning environment), the process (e.g. teaching methodologies, types of actions, learners’ engagement) and the outcomes (e.g. knowledge, values, attitudes, skills, impact on communities).”

20. The same UNESCO report cites MasterCard Foundation’s efforts to measure the ways in which learners understand, express and practice their commitment to service and social transformation in ways that integrate global awareness and identity, when these learners participate in the Foundation’s initiative that educates and supports them to become “‘transformative leaders,’ driving change and making a positive social impact in their communities” (Burciul, 2013, in UNESCO, 2014). Measurement indicator categories for this endeavor include the following: 1) Student interprets local context as embedded in global context; 2) Student’s ethical framework incorporates global sensibility; 3) Student’s lived experience incorporates global orientation.

21. The same UNESCO (2014) report highlights Plan International and the University of Melbourne’s Youth Research Centre program that connects groups of students in Australian schools with children in Indonesian communities to foster understanding of how issues faced by young people in their own communities relate to wider global issues. Research undertaken over 3 years about outcomes of the program showed the relationship between skills development, relationships, personal change, and purposeful action toward social change; researchers found that “participants who were able to engage over several iterations of the program were able to identify greater learning outcomes and to consider their roles in the world in substantially changed ways. Additionally, those who were able to mix purposeful, sustained action with reflection and group-based learning over time could engage more deeply with the complex issues raised through the program... reinforce[ing] the importance of interventions that are sustained and systemic rather than ad hoc and episodic.”

### **The Education 2030 taxonomy and curriculum redesign, implementation and assessment**

22. The OCED (2016) captured well both the perceived opportunities and threats posed by globalization, when it observed that “globalization brings innovation, new experiences and higher living standards; but it equally contributes to economic inequality and social division. Automation and internet business models may have encouraged entrepreneurship, but they may also have weakened job security and benefits. For some, cross-border migration means the ability to commute between continents; for others, it means escaping from poverty and war – and the long struggle to adapt to a new country. Around the world, in the face of widening income gaps, there is a need to dissolve tensions and re-build social capital.”

---

<sup>2</sup> Please note that the author wrote this paragraph first for Reimers, et al (2016).

23. In this context, this concept proposes that global citizenship is not a “nice to have” area of focus, but a “must have” in the 21<sup>st</sup> century. It also acknowledges that it may be challenging for schools to adopt new curricula. However, it supports the idea that the 2030 Framework, with its focus on knowledge, skills, attitudes, values, and the complementary focus on action, is a helpful way to shift the focus of existing subject curricula and standards to emphasizing global citizenship.

24. Indeed, while global citizenship education is a relatively new concept, the phenomenon of globalization is not; for example, examining the Silk Road as a trade route that spread not only goods but also beliefs, technologies, and cultures, in history, would highlight our interdependence. Placing emphasis on building knowledge about the history and contribution of cultures other than one’s own, through the subject of social studies/ history, would be helpful in instilling the attitude of respect toward other people and cultures. UNESCO (2016)’s newly issued Global Education Monitoring report also observes that “education for global citizenship and sustainable development is not necessarily an additional subject to the curriculum” but rather, “best adopted in a whole-school approach, with these themes explicitly expressed in school-wide priorities and school ethos, involving everyone from learners to the wider community. Whole school approaches require more participatory and democratic decision-making that engages all stakeholders, including community members, school management, principals, teachers, parents and students (Bourn et al, 2016 and UNESCO, 2015, in UNESCO, 2016).

25. In addition, this concept note proposes that the Education 2030 taxonomy and its emphasis on knowledge, skills, attitudes, and values would be helpful in constructing the kind of global citizenship education that focuses on developing the person of the “citizen.” In addition, UNESCO’s document, *Learning: The Treasure Within*, notes that “people need gradually to become world citizens without losing their roots and while continuing to play an active part in the life of their nation and their local community.”

26. Thus, this note highlights the desirability of focusing on the Education 2030 taxonomy as a means to enable youth to find ways to identify as active contributors and members of their local, national, and global communities, even as schools assist them in understanding the tensions that come with globalization. Identifying and amplifying existing teaching and learning practices that enable and support students to become experts in the kinds of knowledge, skills, attitudes, values, and actions relevant to GCE would enable educators and education ministries to redesign and direct curricula and pedagogies in ways that would engage young people in relevant, rigorous, and meaningful learning experiences that enable them to positively contribute to the world.

**B) Global Citizenship - UNESCO Section of Education for Sustainable Development and Global Citizenship**

Knowledge			Skills			Attitudes & Values
Disciplinary / learning areas	Inter-disciplinary / cross curricular	Practical	Cognitive & meta-cognitive	Social & emotional	Physical & practical	
<p>All subject areas could be entry points for interdisciplinary learning on global citizenship. However, there is a propensity to address GCED related issues on subjects such as civic or citizenship education, social studies and history.</p>	<ul style="list-style-type: none"> <li>• Knowledge and understanding of local, national and global issues and the interconnectedness and interdependency of different countries and populations</li> <li>• Understanding local, national and global issues, governance systems and structures</li> <li>• Understand different communities people belong to and how these are connected</li> <li>• Identify difference and respect for diversity, and different levels of identity</li> <li>• Knowledge about local, national and global systems and structures</li> <li>• Knowledge about issues affecting interaction and connectedness of communities at local, national and global levels</li> <li>• Understanding underlying assumptions and power dynamics.</li> </ul>	<ul style="list-style-type: none"> <li>• Understanding social entrepreneurship</li> <li>• Knowledge needed for civic participation</li> <li>• Knowledge for civic engagement</li> <li>• Understanding volunteering</li> <li>• Knowledge required for conflict management</li> <li>• Knowledge needed for mediation</li> </ul>	<ul style="list-style-type: none"> <li>• Critical thinking</li> <li>• Critical inquiry</li> <li>• Inter-disciplinary working skills</li> <li>• Problem-solving</li> </ul>	<ul style="list-style-type: none"> <li>• Experience a sense of belonging to a common humanity</li> <li>• Share values and responsibilities, based on human rights</li> <li>• Develop motivation and willingness to take necessary actions</li> <li>• Demonstrate personal and social responsibility for a peaceful and sustainable world</li> <li>• Learners act effectively and responsibly at local, national and global levels for a more peaceful and sustainable world</li> </ul>	<ul style="list-style-type: none"> <li>• Planning and realizing innovative projects</li> <li>• Skills required for social entrepreneurship</li> <li>• Skills for civic participation</li> <li>• Skills for civic engagement</li> <li>• Skills needed for volunteering</li> <li>• Communication and interpersonal skills</li> <li>• Ethical Leadership skills</li> <li>• Teamwork and collaboration</li> <li>• Conflict management</li> <li>• Skills required for mediation</li> </ul>	<ul style="list-style-type: none"> <li>• Empathy</li> <li>• Solidarity</li> <li>• Respect for differences</li> <li>• Respect for diversity</li> <li>• Appreciate diverse identities</li> <li>• Value relationships</li> <li>• Feeling of belongingness</li> <li>• Share values and responsibilities based on human rights</li> <li>• Appreciate differences</li> <li>• Appreciate diversity</li> <li>• Willingness to care for the common good</li> </ul>

27. UNESCO identified three core conceptual dimensions that are common to varied definitions of the objectives, indicators and learning outcomes of global citizenship education:

- **Cognitive:** to acquire knowledge, understanding and critical thinking about global issues and the interconnectedness/ interdependency of countries and different populations.
- **Socio-emotional:** to have a sense of belonging to a common humanity, sharing values and responsibilities, sharing empathy, solidarity and respect for differences and diversity.
- **Behavioral:** to act responsibly at local, national and global levels for a more peaceful and sustainable world.

28. On the basis of these core dimensions, global citizenship education can be contextualized.

Figure 2. UNESCO Global Citizenship Education



Source: Global Citizenship Education: Topics and Learning Objectives; UNESCO, 2015

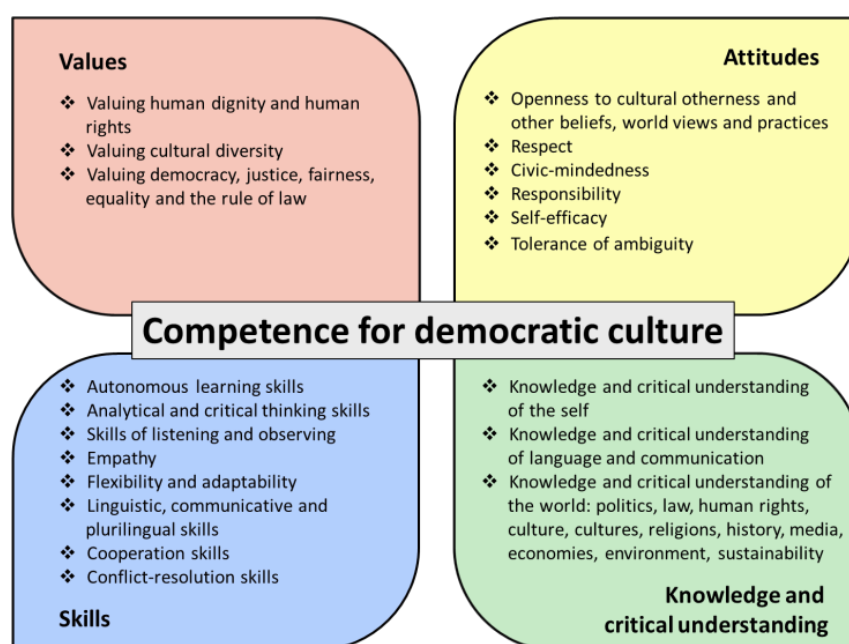
*C) Global Citizenship - Competences for Democratic Culture: Mr Calin Rus, Expert, Council of Europe*

Knowledge			Skills			Attitudes & Values
Disciplinary / learning areas / k	Inter-disciplinary / cross curricular	Practical	Cognitive & meta-cognitive	Social & emotional	Physical & practical	
<i>Constructs</i> Knowledge and critical understanding of the world: politics, law, human rights, culture, cultures, religions, history, media, economies, environment, sustainability	<i>Constructs</i> Knowledge and critical understanding of the self	<i>Constructs</i> Knowledge and critical understanding of language and communication	<i>Constructs</i> Analytical and critical thinking skills Autonomous learning skills	<i>Constructs</i> Empathy Flexibility and adaptability Co-operation skills	<i>Constructs</i> Skills of listening and observing Linguistic, communicative and plurilingual skills Conflict-resolution skills	<i>Constructs</i> Valuing human dignity and human rights Valuing cultural diversity Valuing democracy, justice, fairness, equality and the rule of law  Openness to cultural otherness and to other beliefs, world views and practices Respect Civic-mindedness Responsibility Self-efficacy Tolerance of ambiguity

## Introduction

29. The final declaration of the 25<sup>th</sup> Standing Conference of the Ministers of Education of the 47 member states of the Council of Europe, adopted in April 2016 in Brussels, welcomed the Council of Europe Reference Framework of Competences for Democratic Culture (RFCDC) and expressed the commitment of the ministries of education across Europe to use this framework as a reference and take concrete action at national level to make the preparation for lifelong active democratic citizenship of all learners in education and training a hallmark of the quality of European education systems and an essential part of the response to the current challenges Europe is facing and to provide all learners with the necessary competences (values, attitudes, skills, knowledge and critical understanding) that will enable them to engage as active citizens in democratic and diverse societies. The core element of the RFCDC, developed since 2014 by a transnational group of experts under the coordination of the Education Department of the Council of Europe, is represented by a new model of Competences for Democratic Culture. The model of Competences for Democratic Culture (CDC model) consists of 3 sets of values, 6 attitudes, 8 skills and 3 bodies of knowledge and critical understanding, as shown in the diagram below and is based in a systematic analysis of existing conceptual schemes of democratic competence and intercultural competence.

**Figure 3. Council of Europe - Competence for democratic culture**



30. The term 'culture of democracy' rather than 'democracy' is used to emphasise the fact that, while democracy cannot exist without democratic institutions and laws, such institutions and laws cannot work in practice unless they are grounded in a culture of democracy, that is, in democratic values, attitudes and practices. Among other things, these include a commitment to the rule of law and human rights, a commitment to the public sphere, a conviction that conflicts must be resolved peacefully, acknowledgement of and respect for diversity, a willingness to express one's own opinions, a willingness to listen to the opinions of others, a commitment to decisions being made by majorities, a commitment to the protection of minorities and their rights, and a willingness to engage in dialogue across cultural divides.

31. The CDC model is closely connected with the concept of global citizenship. First of all, the terms “citizen” and “citizenship” used in the description of the CDC model are not understood as limited to national references. Thus, the term ‘citizens’ is used to denote all individuals who are affected by democratic decision-making and who can engage with democratic processes and institutions (rather than to denote only those who hold legal citizenship and the passport of a particular state). Such democratic processes therefore concern local, national but also global issues.

32. Moreover, there are several elements of the CDC model which are defined with a view to the global dimension. The values included in the CDC model are all considered as universal values, valid for all human societies. Also, openness to cultural otherness and to other beliefs, world views and practices is an attitude particularly relevant for global competence, civic-mindedness is defined with reference to belonging to a variety of groups, including the “global community” and explicit references to various global issues are made within the knowledge and critical understanding of the world.

### **Global citizenship through the lens of four principles:**

#### ***Relevant for 2030***

33. Several Council of Europe documents mention that there are four equally important aims of education systems: preparation for the labour market, personal development, the contribution to the development and maintenance of an advanced knowledge base and the preparation for life as active citizens in democratic societies. The CDC, and implicitly the competence for global citizenship have direct relevance for the latter aim and represent key elements in preparing learners for their role of citizen. There are several trends which are likely to influence the way this role of citizen will be performed in the perspective of 2030 and which make the global dimension even more relevant than it is today. The role of citizen cannot be limited to voting representatives which make decisions regarding essentially their constituency. First, even decisions which may appear as referring to a local community have more and more often consequences on other communities or even global consequences. Secondly, citizens have a role in influencing their national governments with regards to decisions of global significance, from decisions related to global warming, to decisions related to security, migration, global trade or scientific research. Thirdly, in a time when internet connects people across national borders, transnational networks of citizens can have an important role in putting issues on the global political agenda, in influencing decisions made on these matters by national or international bodies, as well as in monitoring the implementation of public policies. If the role of citizen is understood in this way, with a view to the world of 2030, it becomes clear that education systems has a responsibility to contribute to the development of the competences needed for effectively performing this role.

34. The CDC model proposed by the Council of Europe can be taken as a reference for orienting the action of education systems in developing global citizenship competence in the coming years, thus contributing to the effective response that education will provide to the needs of a more and more globalised world in the perspective of 2030.

#### ***Impactful***

35. It is in principle difficult to prove a direct linear relationship between individual global citizenship competence and positive societal changes. However, having people with a higher level of competence with regards to their role of citizen, at all levels, including the global level, will certainly contribute to improvements in society. Competent citizens are less likely to be manipulated by xenophobic and populist politicians, less likely to support exclusionist or unfair policies, less likely to fall in the trap of online hate speech, or even radicalisation and endorsement of violent extremism. Global competence also enhances the effectiveness of participating in intercultural dialogue, which is of central importance to



democratic processes within culturally diverse societies. A fundamental principle of democracy is that the people who are affected by political decisions should be able to express their views when those decisions are being made and that decision-makers should pay attention to those views. Intercultural dialogue is the single most important means through which citizens can express their opinions, aspirations, concerns and needs to those who have different cultural affiliations from themselves. This means that, in culturally diverse societies, intercultural dialogue is crucial for democratic discussion, debate and deliberation, and for enabling all citizens to contribute to political decision-making on an equal footing. Likewise, democratic attitudes are crucial for intercultural dialogue because it is only when individuals regard each other as democratic equals that truly respectful communication and dialogue may take place between them. A culture of democracy and intercultural dialogue are inherently interdependent in culturally diverse societies. There is good evidence that educational interventions can be used to counter prejudice and intolerance towards other national, ethnic and religious groups (Aboud & Levy, 2000), and to reduce support for violent extremism in the name of religion (especially when that education is delivered in collaboration with local partners and community organisations) (Department for Communities and Local Government, 2010). There is also good evidence that appropriate educational input and practices can boost democratic engagement (Barrett & Zani, 2015), as well as the civic and political participation of young people belonging to minority groups or having a migrant background (Zani & Barrett, 2012). By consequence, the education systems need to acknowledge the importance of developing global citizenship and democratic citizenship in general (Boix Mansilla, Schwartz & Jackson, 2013).

36. These ideas have been endorsed by the representatives of Council of Europe member states in various documents, including the Council of Europe Charter on Education for Democratic Citizenship and Human Rights Education (2010), the Action Plan on the fight against violent extremism and radicalisation leading to terrorism (2015) or the Final Declaration of the Council of Europe Standing Conference of Ministers of Education: “Securing Democracy through Education” The development of a Reference Framework of Competences for Democratic Culture” (2016).

### ***Malleable***

37. There is no doubt that it is possible to design educational activities aiming at the acquisition of skills, knowledge and critical understanding. It is less obvious if educational activities can actually lead to changes with regards to values and attitudes. In a workshop organised by the Council of Europe in March 2016 this issue was addressed with a group of teachers and teacher educators from ten European countries, based on a set of educational designed precisely to cover in a balanced way the development of values, attitudes, skills, knowledge and critical understanding. These activities were selected, adapted or inspired from a variety of publications produced by the Council of Europe, particularly in the context of the work on Education for Democratic Citizenship, Human Rights Education and Intercultural Education<sup>3</sup>. The activities included in these publications, based on a constructivist pedagogical approach and on experiential learning, have been widely used in formal and non-formal settings across Europe and proved to be successful in generating positive changes also regarding values and attitudes. The key point is that global citizenship competence needs to be developed through activities involving both interaction and reflection, and cannot be thought in a classical approach. If someone is knowledgeable about global issues and is able to provide socially desirable answers to a set of questions it does not mean that that person has indeed a high level of global citizenship competence.

---

<sup>3</sup> These publications are available at [www.coe.int/edc](http://www.coe.int/edc), [www.coe.int/compass](http://www.coe.int/compass), [www.coe.int/lang](http://www.coe.int/lang), [www.coe.int/pestalozzi](http://www.coe.int/pestalozzi)

### *Measurable*

38. One of the key criteria used in elaborating the CDC model was that the components of the model should be assessable in an educational setting. In order to define meaningful learning outcomes, it is essential to have the possibility to confirm their achievement for all students. Thus, not only that the constructs composing the model need to be clear conceptually, so that effective strategies and instruments are designed for their assessment, but it should also be possible for them to be assessed by education professionals as part of the educational process.

39. However, despite the consideration of this criterion in the selection of competences to include in the CDC model, a number of challenges need to be acknowledged.

- a) First, although for the assessment of knowledge things are relatively straightforward, the CDC model has knowledge systematically connected with critical understanding, for which the assessment is more problematic and potentially affected by subjective factors. This is even more relevant in the case of the knowledge and critical understanding of the self, which includes critical reflection on one's cultural affiliations.
- b) Secondly, the skills related to CDC and global competence may well be assessed in an educational setting but this is not a guarantee that learners actually can display these skills in real-life situations.
- c) Thirdly, the most obvious challenge is related to the assessment of attitudes and values. In this respect reservations can be formulated not only towards the accuracy of the assessment and the adequacy of the instruments and procedures used for this purpose, but also with regards to the legitimacy of the assessment in this case.

40. From this perspective, the Council of Europe has launched a consultation process with experts in the field to review the options available and to find ways to address these challenges. Its conclusions will be available in November 2016.

41. From the early phase of the design of the CDC project, the choice was made to take as a reference the approach used in the context of the Common European Reference Framework for Languages, based on competence descriptors. Descriptors of CDC are statements describing observable behaviour which indicates that a learner is mastering a certain competence of the model and are formulated using the language of learning outcomes, which makes them easy to use in the design of educational activities, but also in the assessment of learning. The use of competence descriptors for assessment can also support the extension of the range of assessment methods and instruments to include also qualitative data and encourages formative assessment, without excluding the use of summative assessment as well.

### **The Education 2030 taxonomy and curriculum redesign, implementation and assessment**

42. As it was illustrated above, Education 2030 taxonomy is compatible both with its structure and with its underlying principles with the CDC model. Moreover, the compatibility and the convergence extend also to the aims and the potential for practical use. As analysed in the background documents to the Conference of the Ministers of Education, there are five main ways in which the CDC framework is expected to be used in practice:

- Curriculum redesign: The CDC framework can be used to review and revise the current curriculum, ensuring that the 20 competences of the CDC framework are present in the curriculum goals and learning objectives, that there no elements in the curriculum which are

opposed to the CDC framework and that the 20 competences are covered in a coherent manner across a variety of curricular areas and subject matters.

- Planning, design, delivery and evaluation of educational activities: Teachers can use selected competence descriptors to plan, design and deliver educational activities which at the same time cover curriculum elements and develop the capacity for democratic culture. Descriptors can also be used for the evaluation and possible review of the educational activities implemented.
- The assessment of pupils: With the necessary safeguards in place to prevent the misuse of the framework in assessment, the framework can be used for formative, as well as summative assessment.

43. For this purpose, teachers will need support in understanding the ways in which the CDC framework can be a tool for their work, overcoming fear and resistances, and equipping teachers with the skills necessary for using the CDC framework effectively. Also, inspection and other quality assurance mechanisms and practices could address the implementation of the CDC framework and support teachers in its use.

44. We can therefore argue that the CDC framework can be considered as an example of applying the OECD Education 2030 taxonomy to a specific area of education, dedicated to building competences for the role of citizen.

***D) Global Aspects of Civic and Citizenship Education - Inter-national Association for the Evaluation of Educational Achievement (IEA) International Civic and Citizenship Study (ICCS)***

Knowledge	Skills	Attitudes & Values
Inter-disciplinary / cross curricular	Cognitive & meta-cognitive	
<p><i>Constructs</i></p> <p><b>Civic Society and systems:</b></p> <ul style="list-style-type: none"> <li>• Knowledge, understanding and beliefs about Citizens’ and groups’ assigned and desired roles, rights and responsibilities within their civic society</li> <li>• Knowledge, understanding and beliefs about Citizens’ and groups’ opportunities and abilities to engage within their civic society</li> <li>• State Institutions</li> <li>• Bureaucracies</li> <li>• Civil Institutions</li> </ul> <p style="text-align: center;">}                   Key Concepts:</p> <ul style="list-style-type: none"> <li>○ Power/Authority</li> <li>○ Rules/Law</li> <li>○ Constitution</li> <li>○ Governance</li> <li>○ Decision-making</li> <li>○ Negotiation</li> <li>○ Accountability</li> <li>○ Democracy</li> <li>○ Sovereignty</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• <b>Define</b> (Identify statements that define civic and citizenship concepts and content)</li> <li>• <b>Describe</b> (Identify statements that described the key characteristics of civic and citizenship concepts and content)</li> <li>• <b>Illustrate with examples</b> (Identify examples that support or clarify statements about civic and citizenship concepts and content)</li> <li>• <b>Interpret information</b> (Identify information presented in textual, graphical and/or tabular form that makes sense of the information in the light of a civic or citizenship concept)</li> <li>• <b>Relate</b> (use the key defining aspects of a civic and citizenship concept to explain or recognize how an example illustrates a concept)</li> <li>• <b>Justify</b> (Use evidence and civic and citizenship concepts to construct or recognize a reasoned argument to support a point of view.)</li> <li>• <b>Integrate</b> (Identify connections between different concepts across themes and across civic and citizenship content)</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• Perceptions of good citizenship</li> <li>• Trust in institutions</li> <li>• Perceptions of threats to the world’s future</li> <li>• Attitudes toward the influence of religion in society</li> <li>• Students’ perceptions of European future</li> <li>• Students’ attitudes toward European cooperation</li> <li>• Students’ attitudes toward the European Union</li> <li>• Students’ attitudes toward authoritarian government practices</li> <li>• Students’ attitudes towards democratic values</li> <li>• Students’ attitudes toward gender rights</li> <li>• Students’ attitudes toward equal rights for all ethnic/racial groups</li> <li>• Students’ attitudes toward equal rights for immigrants</li> <li>• Students’ perception of discrimination in European</li> </ul>

<ul style="list-style-type: none"> <li>○ Nation-building</li> <li>○ Statelessness</li> <li>○ Franchise/voting</li> <li>○ The economy</li> <li>○ The welfare state</li> <li>○ Treaties</li> <li>○ Sustainable development</li> <li>○ Environmental sustainability</li> <li>○ Globalization</li> <li>○ Dissent</li> </ul> <p><b>Civic Principles:</b></p> <ul style="list-style-type: none"> <li>● Equity</li> <li>● Freedom</li> <li>● Sense of community</li> <li>● Rule of law</li> </ul> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>○ Concern for the common good</li> <li>○ Human Rights</li> <li>○ Empathy</li> <li>○ Social Justice</li> <li>○ Inclusiveness</li> <li>○ Equality</li> <li>○ Separation of Powers</li> </ul> <p><b>Civic Participation:</b></p> <ul style="list-style-type: none"> <li>● Decision-making</li> <li>● Influencing</li> <li>● Community participation</li> </ul> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>○ Civic Engagement</li> </ul>	<p>domain)</p> <ul style="list-style-type: none"> <li>● <b>Generalize</b> (Identify civic and citizenship conceptual principles manifested as specific examples and explain how these may apply in other civic and citizenship contexts.)</li> <li>● <b>Evaluate</b> (Identify judgments about the advantages and disadvantages of alternative points of view or approaches to civic and citizenship concepts and actions)</li> <li>● <b>Suggest Solutions</b> (Identify courses of action or thought that can be used to alleviate civic and citizenship problems expressed as conflict, tension, and/or unresolved or contested ideas)</li> <li>● <b>Predict</b> (Identify likely outcomes of given civic and citizenship policies strategies and/or actions.)</li> </ul>	<p>societies</p> <ul style="list-style-type: none"> <li>● Students' views on age limitations for young people</li> <li>● Students' perception of discrimination of minorities in Latin American societies</li> <li>● Students' attitudes toward disobedience to the law</li> <li>● Students' sense of empathy</li> <li>● Students' attitudes toward homosexuality</li> <li>● Students' assessment of the value of student participation at school</li> <li>● Students' attitudes toward political consumerism</li> <li>● Students' attitudes toward corrupt practices</li> <li>● Students' attitudes toward violence</li> <li>● Students' attitudes toward their country of residence</li> <li>● Students' sense of European identity</li> <li>● Students' perceptions of their own individual future</li> <li>● Students' acceptance of diversity</li> <li>● Students' interest in political and social issues</li> <li>● Students' sense of citizenship self-efficacy</li> </ul>
--	---	--

<ul style="list-style-type: none"> <li>○ Co-operation/ collaboration</li> <li>○ Negotiation/Resolution</li> <li>○ Engagement</li> </ul> <p><b>Civic Identities</b></p> <ul style="list-style-type: none"> <li>● Civic self-image</li> <li>● Civic connectedness</li> </ul> <p>Key Concepts:</p> <ul style="list-style-type: none"> <li>○ Civic self-concept</li> <li>○ Multiplicity</li> <li>○ Diversity</li> <li>○ Cultures/location</li> <li>○ Patriotism</li> <li>○ Nationalism</li> <li>○ Global citizenship</li> </ul> <p>Civic and citizenship values</p>		<ul style="list-style-type: none"> <li>● Expectations to participate in legal and illegal forms of civic action in support of or protest against important issues</li> <li>● Expectations of political participation as adults</li> <li>● Expectations of participating in future school-based activities</li> </ul>
---	--	--

### **Brief description of the ICCS series**

45. IEA's International Civic and Citizenship Education Study (ICCS) series investigates the ways in which young people are prepared to undertake their roles as citizens in a world where contexts of democracy and civic participation continue to change using internationally agreed upon frameworks. It reports on students' knowledge and understanding of concepts and issues related to civics and citizenship, as well as their beliefs, attitudes, and behaviours with respect to this domain (see Table above; Schulz, Ainley, Fraillon & Losito, 2016). The study collects a rich array of contextual data about the organization and content of civic and citizenship education (CCE) in the curriculum, teacher qualifications and experiences, teaching practices, school environment and climate, and home and community support. ICCS assesses students enrolled in the eighth grade, provided that the average age of students at this year level is 13.5 years or above. In countries where the average age of students in Grade 8 is less than 13.5 years, Grade 9 is defined as the target population. Mindful of new and emerging challenges evident in today's world, the ICCS 2016 cycle aims to improve countries' understanding of issues such as students' role with respect to global citizenship, environmental sustainability, social interactions at school, and the use of new social media for civic engagement. The series of ICCS studies established and will continue to establish optional modules of regional or thematic nature so that countries can explore specific topics of common interest.

46. The IEA is collaborating with a number of partners, including UNESCO offices, in the area of measuring Global Citizenship Education (GCED) and Education for Sustainable Development (ESD), with a special emphasis on the 2030 Sustainable Development Goals (SDG) and their related monitoring of these, especially Target 4.7. The next cycle (exact timing currently being determined) intends to build on ICCS 2016 yet extend the thematic coverage to include additional indicators related to GCED and ESD allowing participating countries to assess trends in civic knowledge and engagement over time, the ways in which curricula address CCE/GCED/ESD (structure and content). The international project team developed preliminary mappings of current and potential new test and questionnaire materials, further discussed with the study's academic advisors. The position taken is one that aims to observe and report on how aspect of traditional/national citizenship education as well as global aspects (citizenship, environment, alternative futures) are being implemented by countries in a comparative perspective, and how changing curricular and policy approaches, if any, are manifested in classroom learning activities, assessment and eventually outcomes in terms of values, cognition, attitudes, behavioural intentions and behaviours. IEA ICCS will not treat traditional/national civic and citizenship education and global aspects as separate, orthogonal or hierarchical/nested given that key aspects and elements of CCE/GCED have local, regional and global instances and examples. Tentatively, ICCS has formulated research questions that aim to explore if attitudes, values, understanding and skills – in their respective local context – vary with respect to national and global dimensions.

47. Besides the global indicator for Target 4.7 (i.e. the extent to which GCED and ESD are mainstreamed in national policies, curricula, teacher education and student assessment; indicator 4.7.1), ICCS aims to contribute to the thematic indicator 4.7.4 (the percentage of students by age group, or education level, showing adequate understanding of issues relating to global citizenship and sustainability) in the context of formal education in schools (and more precisely at ISCED Level 2).

***E) Global Competence - OECD PISA***

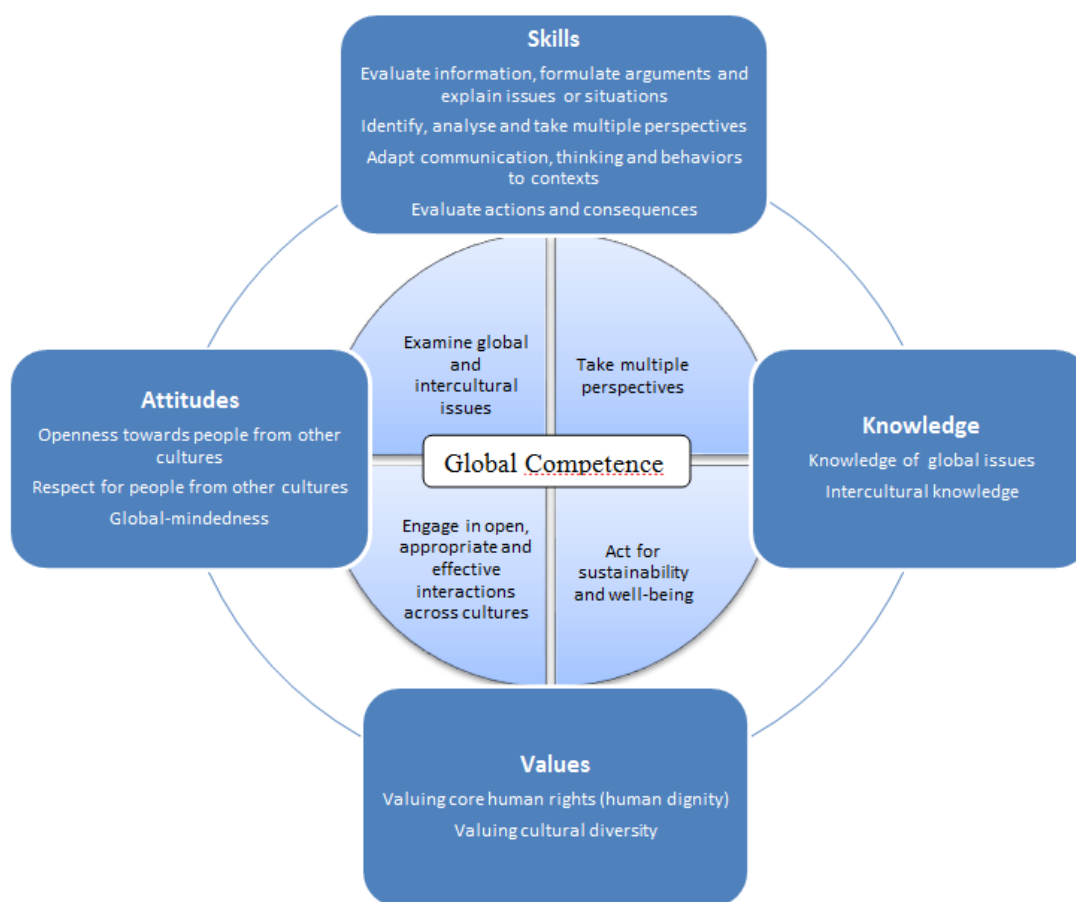
<b>Knowledge</b>	<b>Skills</b>	<b>Attitudes &amp; Values</b>
<ul style="list-style-type: none"> <li>• Knowledge of global issues</li> <li>• Intercultural knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluate evidence and explain issues</li> <li>• Analyse perspectives</li> <li>• Adapt communication and behaviour</li> <li>• Evaluate actions and consequences</li> </ul>	Attitudes: <ul style="list-style-type: none"> <li>• Openness</li> <li>• Respect</li> <li>• Global-mindedness</li> </ul> Values: <ul style="list-style-type: none"> <li>• Valuing human dignity</li> <li>• Valuing cultural diversity</li> </ul>

48. The PISA 2018 assessment will use the following definition of Global Competence: Global Competence is the capacity to examine global and intercultural issues, to take multiple perspectives, to engage in open, appropriate and effective interactions with people from different cultures and to act for collective well-being and sustainable development.

49. Global Competence is a multifaceted cognitive, socio-emotional and civic learning goal, involving four interrelated capacities and ways of behaving that are developed through the successful combination of knowledge, skills, attitudes and values (see Figure 4 below): 1) students' capacity to examine issues and situations of local, global and cultural significance (e.g. poverty, economic interdependence, migration, inequality, environmental risks, conflicts, exchanges across cultures and cultural stereotypes); 2) the capacity to value and take different perspectives as long as they do not violate core human rights (human dignity); 3) the ability to establish positive interactions with people of different national, social, ethnic, religious backgrounds or gender; and 4) the attitudes and capacities to take motivated and constructive action toward sustainable development and wellbeing. The four dimensions overlap significantly and people at all ages need to simultaneously address them to develop global competence. For example, effective and respectful action to solve an intercultural misunderstanding requires that the individual is capable of examining the context in which the incident takes place, understanding and addressing the communication problems that might lie behind the misunderstanding, and that he/she values and utilizes the different cultural perspectives represented in the situation.



**Figure 4. Dimensions of Global Competence and supporting knowledge, skills, attitudes and values**



50. **Dimension 1:** Examine issues and situations of local, global and cultural significance. This dimension refers to the globally competent students' practice to effectively combine critical reasoning and knowledge about the world and cultures whenever they form their own opinion about a global issue or assess interactions between people from different cultural backgrounds. Students who acquire a mature level of development in this dimension use higher order thinking skills such as selecting, weighing and using evidence to reason about and seek explanations to global developments or intercultural interactions.

51. **Dimension 2:** Take multiple perspectives. This dimension highlights that globally competent students are willing and capable to consider global problems and life situations from multiple viewpoints. As young individuals acquire information about other cultures' history, values, politics, communication styles, economy, beliefs and practices, they start to acquire the means to recognize that one's own perspective and behaviour is shaped by multiple influences (e.g., religion, gender, socio-economic status, education), that these influences often escape conscious detection, and that others have views of the world that are profoundly different from one's own (Hanvey, 1976). Globally competent students also account for and appreciate the connections (e.g. basic human rights and needs, common experiences) that enable to bridge differences and create common ground. Global competence, as defined in this assessment framework, emphasizes that diversity in perspectives can be valued as long as it does not violate other people's human rights.

52. **Dimension 3:** Engage in open, appropriate and effective interactions across cultures. With an emphasis on interactions, this dimension of global competence puts a premium on appropriate and

effective communication with people from different cultures. The competent student understands the complexities of intercultural communicative contexts in the form of cultural norms, interactive styles, degrees of formality in a given social context, and adapts his behaviour and communication to these contexts. Development along this dimension calls for students' flexible engagement with languages and conventions for various communicative purposes such as 'when intending to express a belief, interest or need, to explain and clarify ideas, to persuade or negotiate. Finally, this dimension addresses students' appreciation for respectful dialogue and desire to understand the other. It emphasizes students' capacity and habits to interact with others across differences in ways that are open, appropriate and effective. Open interactions means relationships in which all participants demonstrate sensitivity towards, curiosity about and willingness to engage with others and their perspectives. Appropriate refers to interactions that respect the expected cultural norms of both parties. In effective communication all participants are able to achieve their objectives during the interaction, at least in part.

53. **Dimension 4:** Take action for collective well-being and sustainable development. This dimension foregrounds students' role as active and responsible members of society, and refers to students' readiness to take actions to respond to a given local, global or intercultural issue or situation. Whether conceiving students in their role as friends, daughters or members of a local, digital, or distant global community, this dimension of global competence recognizes that young people have multiple realms of influence ranging from intimate and local to digital and global. Taking action may imply intervening to de-escalate a conflict between peers inside or outside the school, initiating a global media campaign in the school, disseminating a personal view point on the refugee crisis in social media or raising funds to contributing nets to a malaria prevention project. Young people who develop Global Competence are better equipped to improve living conditions in their own communities and also to build more just, peaceful, inclusive and environmentally sustainable development.

54. The four dimensions of global competence stem from an integrated view of knowledge, skills and attitudes as inseparable factors contributing to the development of students' understanding of the world, of their successful interactions with others, and their capacity and willingness to take action for improving the well-being of current and future generations. Valuing human dignity and cultural diversity do also contribute to Global Competence because they guide individuals' choices and action as they develop the relevant knowledge, attitudes and skills.

55. "Knowledge" may be defined as the body of information an individual has. Global Competence requires knowledge of global issues that affect lives locally and around the globe as well as intercultural knowledge, or knowledge about the similarities and differences between cultures.

56. Global competence also builds on specific "skills". Skills are defined as the capacity for carrying out a complex and well-organised pattern of thinking (in the case of a cognitive skill) or behaviour (in the case of a behavioural skill) in order to achieve a particular goal. Global Competence requires numerous skills, including the ability to: evaluate information, formulate arguments and explain issues, by engaging in causal reasoning to address questions on social, cultural, environmental and economic development; the capacity to identify, analyse and take multiple perspectives on issues, the ability to communicate respectfully and the capability to adapt one's thoughts, feelings or behaviours to fit new contexts and situations; and the ability to evaluate actions and anticipate short- and long-term consequences.

57. Knowledge and skills are strongly interrelated as students need to use them simultaneously in order to understand intercultural and global problems. The processes of reasoning with evidence or identifying perspectives, for instance, are intertwined with the content being examined. If a student does not know much about an issue, he/she will find it difficult to consider multiple perspectives (Willingham, 2007), communicate about it in rich ways or consider the consequences of action meant to address this topic.

58. In addition to knowledge of global issues, intercultural knowledge, and thinking or behavioural skills, global competence is propelled by important attitudes. Attitudes refer to the overall mind-set that an individual adopts towards a person, a group, an institution, an issue, a behaviour, or a symbol. These general orientations integrate beliefs, opinions, an emotion, feeling or tendency to behave in a particular way towards an object. Globally competent behaviour requires an attitude of openness towards people from other cultures or countries, an attitude of respect for cultural otherness, and an attitude of global-mindedness (i.e. that one is a citizen of the world with commitments and obligations towards the planet and others irrespective of their particular cultural or national background).

59. “Values” are general beliefs that an individual holds about the goals which are important in life. They have a normative prescriptive quality about what ought to be done or thought in different situations, and may be used to guide individuals’ attitudes, judgements and actions. The framework sees valuing human rights and valuing cultural diversity as critical filters through which individuals process information, regulate their interactions with others, and decide how to engage with others and for the world.

60. Knowledge, skills, attitudes and values are dynamically interrelated as foundations of global competence. For instance a student steps in to defend a peer who is being bullied because of his old and stained clothes. He does so because he is able to recognize his friend’s feelings of distress and suffering (skill) and understand the economic circumstances of his family, whose father lost his job after a local factory closed (knowledge). His decision to act is also triggered by his understanding that human dignity is a fundamental value and is sustained by his respect for other people who are less fortunate than himself (an attitude). Thus, globally competent behaviour in response to discrimination and bullying requires the orchestration of a wide range of different knowledge, skills, attitudes and values.

61. The proposed definition builds on a series of premises about the nature of learning and the kinds of outcomes educational systems may seek. For example, it views a globally competent person as someone who understands global as well as local dynamics and interactions. The definition favours a locally rooted view of global competence in which young people appreciate their own cultural and geographic contexts and place them in relationship to larger issues shaping the world or cultures and places elsewhere.

62. 28. This view of global competence argues that it is possible to identify a set of relevant issues or themes of local, global and cultural significance for all 15-year old students around the world (e.g. environmental sustainability, migration, poverty, economic globalisation, cross-cultural dialogue). It also implies that innovative pedagogic approaches should be followed at school to introduce adolescents to these complex topics and help them build a critical and multi-perspective view about global and intercultural issues.

63. 29. The proposed approach holds that students’ understanding of these issues deepens when they can progressively draw on knowledge, methods and habits of mind central to disciplines such as science, history, geography, mathematics, literature - subjects characteristically taught in schools around the world. However, acquiring global competence is a life-long process – there is no one point at which an individual becomes completely globally competent. PISA will assess at what stage in this process 15-year-old students are situated, and how effectively their schools address the development of global competence.

**2. Foresight - Mr Peter Bishop, Teach the Future**

	Knowledge		Cognitive skills	Attitudes & Values
	Disciplinary / learning areas	Inter-disciplinary / cross curricular		
Change -- types	All – the types of change in any discipline	The four attributes of change – source, level, time horizon, rate	Identify important changes going on in their life and in their world and classify the changes identified using the four attributes	Confident that they can handle changes coming to them and influence change toward a more preferable future
Change – STEEP	<b>Social science</b> – the sectors of society <b>History</b> – different sectors of past change	The six STEEP categories – Population, Technology, Economy, Environment, Governance, Culture	Classify the changes identified using the six STEEP categories	Resisting the tendency to narrowly consider change in only one sector or discipline
Change -- eras	<b>History</b> – The demarcation of different eras in the past	Discontinuities and eras and how they fit into the model of punctuated equilibrium	Identify recent or historical discontinuities and describe the eras before and after the discontinuity	Glad to know that they are born into and live in a particular era
Domain	<b>Social science</b> – selecting a suitable focus for a study, such as a group or an issue	Domain	Identify a domain for study	Be excited about learning more about their domain of interest

<b>Current conditions</b>	<b>All</b> – describing the current state of a domain, <b>Math</b> – using quantities to describe the current state of society	The state of a domain	Identify the most important facts and stakeholders in the chosen domain	Glad to know more about their domain of interest
<b>Era analysis</b>	<b>History</b> – comparing two eras with each other, particularly the current era with the previous era	Eras	Identify the discontinuity(ies) that separates the current era from the previous one	Realize that changing eras is a dislocation that affects many people--
<b>Forecasting – different futures</b>	<b>All</b> – describing different types of futures for a domain or a language	The three different futures – expected, alternative futures and the preferable future	See below	Be glad that the future is not singular, but plural and that they can have a role in shaping the future
<b>Expected future</b>	<b>Social science</b> – describing the result of <b>trends</b> and plans in the future <b>Math</b> – using mathematics to extrapolate or model changes in quantities <b>Writing, media</b> – depicting the expected future	The four types of information that point to the expected future – constants, trends, plans and projections	Gather and classify information on the future of the domain from reputable sources and classify according to the four types of information	Feel that the description of the expected future is well supported by the information gathered
<b>Scanning</b>	<b>All</b> – looking for the signs of change	Strong and weak signals of change	Identify strong and weak signals of change in the world at large and within the domain	Resist the temptation to report only verifiable information (strong signals)

<p>Assumption, Uncertainty, Critical thinking</p>	<p><b>All</b> – challenging the assumptions involved in drawing conclusions from evidence</p>	<p>Uncertainty, contingency, and doubt that are inherent in the future and assumptions that assume those uncertainties away</p>	<p>Identify the assumptions that must be true for the expected future to occur and an alternative assumptions that might come true instead with some reason for believing that they might come true</p>	<p>Accept that others' assumptions about the future are reasonable even though one may not believe them oneself</p>
<p>Alternative futures</p>	<p><b>Social science</b> – describing what could plausibly happen if trends and plans do not turn out as expected <b>Writing, media</b> -- depicting the alternative futures using vivid and compelling, yet plausible imagery</p>	<p>Scenarios and the five types of information that point to the alternative futures –</p>	<p>Gather information on the future of the domain from unbiased, yet sometimes marginal sources and classify that information according to the five types of information that point to alternative futures  Create an imaginative presentation of one of those scenarios</p>	<p>Enjoy developing creative scenario presentations that are still well grounded in some type of foundation about how it could actually come about</p>
<p>Implications, Consequences</p>	<p><b>Social science</b> – describing the consequences of these futures for individuals, groups, communities, nations and for the world as a whole</p>	<p>Implication and consequences for one or more people or organizations</p>	<p>Identify the implications of a change, at least up to the third-order implications,</p>	<p>Accept that all change is neutral and that the preference for one change over another lies in the consequences of the changes.</p>

<b>Values, Preferences</b>	<b>Advisory</b> – articulating the basis for one’s choices and decisions	Values, preferences	Describe the most important values in one’s own life and in the general society in the current era	Accept that others’ values about the future are reasonable even though one may not place a priority on them oneself
<b>Vision</b>	<b>History</b> – visionaries in the past and their effect on society <b>Advisory</b> -- setting a long-term, ideal direction for oneself or one’s enterprise	Vision, ideal future	Describe an ambitious, yet plausible future of the world in general or of the domain based the values identified  Create an imaginative presentation of that visionary future	Commit to working for the visionary future as much as one can
<b>Leadership</b>	<b>History</b> – leaders in the past and their effect on society <b>Advisory</b> – deciding whether to become a leader or not	Leadership	Write and deliver a short speech on the value of the visionary future and why it is important that people commit to work for it	Be prepared to accept and discuss questions, issues and objections from others about the value of the visionary future and how it will be achieved
<b>Goals</b>	<b>Advisory</b> – committing to long-term achievements for oneself or one’s enterprise	Goals	Identify one or more concrete achievements (goals)	Commit to collaborate with others to accomplish those goals
<b>Strategies</b>	<b>Advisory</b> – selecting effective strategies for achieving one’s goals	Strategies	Identify one or more concrete sets of activities to increase the chances of accomplishing the goals	Commit with others to engage in those activities

Initiatives	<b>Advisory</b> – implementing the selected strategies in short-term actions	Initiatives	Identify one or more objectives that one or the enterprise could achieve in the short-term	Commit with others to launch those initiatives now or soon
Reflection, Meta-cognition	<p><b>All</b> – recognizing the criteria for effective foresight and comparing and improving one’s performance on those criteria</p> <p><b>Writing, media</b> – expressing one’s reflections in clear and concise terms</p>		<p>Identify the most important things that one learned about the future in this unit or course.</p> <p>Present an argument whether all students should learn things like that or not.</p> <p>Identify how one could use what was learned in other subjects or in one’s life in general.</p>	Feel prepared to anticipate and influence change with confidence and joy

Note: The table is based on the approach to foresight taught at the University of Houston, the first stand-alone degree in futures studies. Other programs and professionals will use variations of these topics and constructs, but the author believes that this approach captures the mainstream of foresight thinking in the field.



## Introduction

64. Foresight is a set of knowledge, skills, attitudes and values that goes beyond traditional thinking about the future. Based on the scientific principles of today's society, most thinking about the future is linear. Its purpose is to use traditional social scientific and management techniques to predict what will happen in the future and to create plans that will achieve identifiable goals in a given period of time. The problem is that the modern world is anything but linear. As information technology progresses, many times more information is created in any given period than ever before. And that information is disseminated at blinding speeds, first through the global media and now through the Internet. The result is that ideas and values from different groups and cultures are interacting like never before. Every interaction has the potential to create innovation and indeed conflict. So the pace of change and the increasing connectivity of the people and institutions of the world require a different way to think about and influence the future.

65. This paper elaborates what foresight educators mean by foresight. How is it different from traditional thinking about the future? And is it more effective in the world we live in today compared to the world that used traditional futures thinking for so long?

## Major concepts in foresight thinking

66. Foresight is an emerging academic discipline and a growing professional community. The first degrees in foresight were offered at the University of Hawaii at Manoa and the University of Houston-Clear Lake in the 1970s. Now between five and ten universities around the world have graduate degree programs.

67. An early professional academic community of futurists established the World Futures Studies Federation in Paris in 1971. A number of practicing foresight professionals formed the Association of Professional Futurists in 2002. The Association now contains more than 400 members, all of whom are active in the field to some extent.

68. A discipline with a number of academic programs and hundreds of practicing professionals is large and complex and therefore difficult to characterize in a brief like this. Global Foresight Books lists more than 200 titles published on futures methods alone since 2009. There might be thousands going back to the 1960s.

69. What might surprise people, however, is that foresight is not just about the future. It is an approach for thinking about the future in the present. Arie de Geus, one of the founders of the scenario planning approach used by the Royal Dutch Shell Corporation, said, "Learning faster is the only sustainable advantage in an environment of rapid innovation and change." (Senge, 1990:4) It's not about getting the future 'right' as it is being prepared to embrace and use change when it arises.

70. Tyler Cowen, author of *Average is Over*, said much the same thing:

*...the second skill [to be successful], and this is a tough one, is to be very good at teaching yourself new things. Right now, our schools are not so good at teaching this skill. The changes we've seen so far are just the beginning; 20-30 years from now, we'll all be doing different things. So people who are very good at teaching themselves, regardless of what their formal background is, will be the big winners.*<sup>4</sup>

---

4. ([http://oecdeducationtoday.blogspot.com/2015\\_07\\_01\\_archive.html](http://oecdeducationtoday.blogspot.com/2015_07_01_archive.html))

71. Foresight does not assume that there is one ‘right’ future or one ‘right’ strategy, as we have often been taught in school. In this century, the future is Volatile, Uncertain, Complex, and Ambiguous (VUCA). As a result, the emerging VUCA world requires thinking that is not set in its ways, but is prepared for and even expects rapid change. It acknowledges that uncertainty is an inherent aspect of our understanding of the future, that ‘both-and’ rather than ‘either-or’ thinking is more suited to the complexities we face, and that every situation is ambiguous. It is never exactly as it appears. Foresight is a systematic way to learn about change and its consequences in the VUCA world, and learn it as rapidly as possible in order to prepare for and to use change to make the world a better place for ourselves, our families, our employers and our communities.

72. The first step in this brief is to characterize foresight thinking using a few key concepts and terms that distinguish it from traditional thinking about the future. These concepts are not meant to turn ordinary students into professional futurists. Rather they are what we believe every educated citizen of the future should know and be able to do in order to navigate the changes they will experience in their lifetime.

- A. **Change** – Change is pervasive, in our lives and in the world at large. We can become more aware of and less apprehensive of change once we understand how it works. At the same time, not everything changes all the time, nor should it. Some things do and should remain the same for relatively long periods of time.
- B. **Future(s)** – The future is open. It is multiple, not singular. We cannot know exactly what will happen, but we can know a) where we are headed, b) some or most of what might happen instead, and c) what we prefer to see happen. What is more, we have the opportunity to influence the future since it is not yet determined, promoting those changes that enhance our values and resisting those that do not.
- C. **Systems** – The world is an interconnected whole. Academic disciplines and occupational careers divide the world into parts for good reason. It is easier to deal with parts than wholes. But the world does not respect our divisions. It is a wholly interconnected entity, and it operates that way. Learning to deal with the world as it is, not as we choose to it be, is important for understanding why and how things change and how to go about making them better.
- D. **Scanning** – Every discipline does research, and foresight is no different. The research we learned in school relies on credible, verifiable information from reputable sources. Foresight professionals use that information, but they use other information as well. Traditional research looks for what foresight professionals call strong signals of change—empirical trends, announced plans by influential stakeholders and projections by reputable forecasters. Strong signals point to the most likely future, rarely to any alternatives. Therefore, foresight professionals also look for weak signals, real changes that are not yet powerful enough to influence the future. But every strong signal began as a weak signal. So foresight professionals sift through many weak signals to imagine a world in which one or more them becomes a strong signal before it does so.
- E. **Expectation** – The strong signals of change have momentum, like in physics where a body in motion will remain in motion unless acted upon by a force. In the same way, strong trends and plans will continue until acted on by a force. The result of those changes is the Expected future, a future that is more likely than any other single future and one that we can discover using the standard techniques of physical and social science.
- F. **Uncertainty** – The Expected future is not guaranteed, however. We cannot predict the future because of its inherent uncertainty. We do not know everything that is changing the future, and some of the changes themselves are inherently uncertain. Something could easily intervene to send the change and its future in a different direction. The result of uncertainty is that the future is always multiple, never singular.
- G. **Assumptions** – Traditional approaches to the future describe only one future, the Expected future, despite the uncertainties. They use assumptions to dispel or hide the uncertainties. Assumptions are beliefs about the world that may be credible, but they are not facts. When one assumes

something to be true, the uncertainty associated with that assumption goes away, at least in the forecaster's mind, but not in the world. Making assumptions about the future is important and even necessary. The problem, however, is when we do not test the assumptions against their alternatives. Finding a plausible alternative assumption is the essence of critical thinking, and every plausible alternative assumption leads away from the expected future to one or more alternative futures. So thinking critically about the Expected future identifies other futures that could plausibly occur.

- H. **Scenarios** – Alternative futures are presented as scenarios, stories of plausible futures. Scenarios are not predictions about the future. Rather they establish a range of plausible futures that we can anticipate (prepare for) and influence (create). But scenarios are useful even if none of them occurs. They make us more comfortable with change and its effects. They require us to get out of the present and out of the Expected future by imagining other alternative worlds that we may live in. As a result, we are better prepared for whatever change does occur compared to others who do not think about those futures at all.
- I. **Implications** – Understanding changes by themselves is not enough. We must also look to the first-, second-, nth-order implication that the change creates. Many times we get the future 'right' only to be blind-sided by unintended consequences. We cannot list all the consequences of a change, but we can know many more of them if we pay attention to implications for the future.
- J. **Agency** – The world and the powers that run the world would like us to believe that the future is already determined by nature or by them, that there is not much we can do to change the future or to achieve a more preferable future than would ordinarily occur. While the forces that keep things the same or on the same course are massive, they are not omnipotent. Committed individuals and groups have changed the future before, and they will do so again—many in small ways and a few in historic ways. Everyone has the power to change their future and the future of those around them if they commit to a vision of preferred future, select achievable goals that move themselves and their communities toward the visionary future, and implement effective strategies for achieving those goals over a long period of time.
- K. **Vision** – The best that we or the world can be. A vision is a direction, not a destination. We rarely achieve the vision. If we do, it was probably not ambitious enough. Rather it points in a consistent direction toward an ideal future through the many stages and periods of our life.
- L. **Leaders** – The common use of the term 'leader' is someone who is in charge of something, like a CEO or a General. But foresight professionals believe that everyone can be a leader whether they are in charge or not. Those in charge are actually authorities, individuals hired or elected to make decisions for the group or organization. Leaders, on the other hand, are those who promote a visionary, often disruptive future and enroll others in a campaign to move toward that future by achieving worthwhile goals and using effective strategies over a long period of time. Authorities may be leaders, but they do not have to be in order to fulfill their responsibilities.

## **Foresight through the lens of four principles**

### ***Relevant towards 2030***

73. One of the indisputable marks our era, particularly this century, is an increasing rate of change and greater connectivity among people, institutions and issues across the globe. These rates are driven by orders of magnitude increases in the volume of information, the accessibility to that information and the speed of communication among people and even now among machines themselves. Increasing information has always had profound effects on society – from the invention of writing that allowed people to store information and communicate at a distance, through the printing press which touched off the Renaissance, the Protestant Reformation and indeed the modern world, to electronic communication from the telegraph to the Internet today.

74. The Enlightenment was one of those periods of significant change and creativity. J. B. Bury argues in his book, *The Idea of Progress*, that Enlightenment thinkers created the idea of the future as the time when improvements in technology and society were to be realized (Bury & J. B. (John Bagnell) Bury, 2004). In fact, the first utopia to be set in the future was Sebastien Mercier's *L'Ann 2440* published in 1771. Along with the idea of the future came the tools for predicting and eventually planning for the future. Social scientists in the 20<sup>th</sup> century developed tools like trend extrapolation, systems modeling, political polling and strategic planning to understand how the future would develop.

75. These tools served society well for the time when change was slower and more predictable. One thing they left out, however, was the possibility of disruption and discontinuity. They all fail when the system experiences discontinuous change because all models require the assumption of continuity. So current approaches to the future do not take potential disruptions into account. As a result, students are being taught that the future is generally a linear extrapolation of the past, if they are taught about the future at all. They take that learning into their personal and professional lives. They don't realize that disruptions are not only possible, but they are in fact becoming more common given the increasing rate and complexity of change described above. It is time that we include a different model of change and the future in schools so students are prepared for the real future they are facing, not the future that traditional approaches to the future want them to have.

76. A secondary benefit of an open future is that students can realize that they can have some influence on the future as well. Understanding the future is important for academics and professional forecasters, but being successful in the future is important for everyone. Students are disempowered by the belief that the future is a deterministic extrapolation, that they have little say about that, and that the most powerful people and institutions will resist them trying to create change. While that last statement is true, we should at least give them some hope that they can influence their own future and the future of those around them and perhaps create even more change than if they think the future is fixed. Not only should they work to be successful themselves, they should take the appropriate amount of responsibility for their families, their communities and indeed the world as a whole. Individualism reigns in the modern world, but collective responsibility will be the only way that we successfully navigate the treacherous waters ahead.

### ***Impactful***

77. Jennifer Gidley, Debra Bateman and Caroline Smith (Gidley, 2004) published an extensive review of the literature on foresight education. They reviewed the work of the major contributors to this field, including David Hicks, Richard Slaughter and Gidley and Bateman themselves. They found that a lot had been written about the need for and value of foresight education, but they found little support for that claim beyond anecdotal observations.

78. Bateman herself did her dissertation working with the teachers in a fifth grade class in Melbourne (Bateman, 2012). She focused on the teachers more than the students and reported that teachers changed their view of the future considerably. Presumably, those teachers passed their insights onto their students, but the article does describe how much of that occurred.

79. Most of the research in foresight education describes students' attitudes toward the future – their hopes, their fears and their overall expectations about the future. The consistent finding is that young people have significant aspirations for the future, but that most do not expect their aspirations to be realized. Eckersley put it this way, "Most do not expect life to be better in 2010, either nationally or globally, but foresee a continuation, and even worsening, of today's problems." (Eckersley, 1997). That finding is repeated again and again. While interesting and somewhat troubling, this research, however, does not speak directly to whether teaching foresight is impactful.

80. David Hicks conducted a pilot study involving students studying to become teachers in Great Britain (1996). He used a workshop process that Elise Boulding pioneered in which students are asked to develop and then discuss the future they expect to happen and the one they hope would happen. One of his three research questions was “Does this process help students generate images of preferred futures?” In the end, students did generate robust images of the preferred future, but those responses were not compared with students who did not have the same workshop so no conclusion could be drawn about whether foresight education helped them generate those images or not.

81. Gidley conducted an intervention to bring a measure of hope to a group of high school students in Australia. A pilot study with 14-15 year old high school students (N=51), investigated the effects of a cognitive intervention strategy of time projection, on hopelessness. Both control and experimental groups were pre-tested on hopelessness (BHS) and images of the future (Positive Future Scale). A four session intervention program, called 'Creating Positive Futures', targeted the negative images of the future among the experimental group and attempted to promote more positive images of the future. The control group attended normal classes. After the intervention, both groups were post-tested on the same scales and a repeated measures analysis of variance was used to analyse the change and interrelationships. The intervention resulted in a statistically significant increase in positive future images ( $p = 0.01$ ) of the experimental group compared with the control group relative to pre-test scores. Correlations between the BHS and the PFS were significant at both the pre-test ( $p = 0.25$ ) and the post-test ( $p = >0.001$ ) for the whole group. The Positive Future Scale (PFS) was also validated as part of the study. The study also indicated that the intervention had potential for reducing hopelessness, particularly in boys, though this did not reach statistical significance (Gidley, 2001). This is the only study found that directly addresses the impact of foresight education.

### *Malleable*

82. Foresight can be taught at any level. Bateman worked with fifth grade teachers to include foresight in their classes (Bateman, 2012). Hicks and Holden reviewed studies of children’s images of the future from pre-school to secondary (Hicks & Holden, 2007).

83. Teach the Future, a non-profit organization to introduce foresight thinking to primary, secondary and tertiary schools, is in touch with teachers who are teaching foresight in an elementary school in Pittsburgh, middle school teachers in North Carolina, a high school class outside Houston, an Associate’s Degree at San Diego City College and an undergraduate course in the business school at the University of Notre Dame. Unfortunately, very little foresight is being taught anywhere. When it is, it could be a stand alone course as Dr. Peter Bishop taught at Emery High School on the future of Houston in 2013. More commonly, it is a unit or a project within an existing course. Nancy Liscum, a senior language arts teacher at Clements High School in Sugar Land TX, taught a unit on the future of the English language. Joe Sears, a history teacher at Emery High School, assigned a term project in which students were to create a chapter of a history textbook in 2085 based on a plausible event that happened between 2020 and 2040. The Teach the Future [Library](#) contains whole courses, units of courses and activities for teaching foresight at all levels.

### *Measurable*

84. No rubrics or other instruments have been published that measure the degree to which students or people in general think about the future.

85. Social Technologies, a consulting firm, development a Foresight Capability Matrix that assesses how well firms or units practice foresight (Grim, 2009). The Association of Professional Futurists has

developed a competency model for foresight practitioners ('Final' Version of Foresight Competency Model, 2016.) Each of these models contains the following competencies –

- [Foresight Maturity Model](#) – Leadership, Framing, Planning, Scanning, Forecasting and Visioning.
- [Foresight Competency Model](#) – Framing, Scanning, Futuring, Visioning, Designing, Adapting

86. While neither of these is education, their competencies and indicators could be adapted to build an educational rubric.

87. The above table includes a candidate set of learning objectives created by the author including a set of behavioral objectives for knowledge, skills and attitudes associated with each objective. Those could be turned into a rubric for measuring the degree of mastery for each objective.

### 3. Education for Sustainable Development (UN SDG 4.7) - UNESCO Section of Education for Sustainable Development and Global Citizenship

Knowledge			Skills			Attitudes & Values
Disciplinary / learning areas	Inter-disciplinary / cross curricular	Practical	Cognitive & meta-cognitive	Social & emotional	Physical & practical	
All subject areas can be entry points for interdisciplinary learning on ESD	<ul style="list-style-type: none"> <li>Understanding Sustainable development</li> <li>Understanding the causes and impact of climate change</li> <li>Understanding and importance of biodiversity</li> <li>Knowledge of sustainable production and consumption cycles</li> <li>Knowledge of sustainable lifestyles</li> <li>Understanding the causes of natural disasters and measures for disaster risk reduction</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge of sustainable practices in different disciplines: architecture, design, agriculture, urbanism, etc.</li> <li>Knowledge needed to engage in a green economy</li> <li>Knowledge for civic engagement</li> </ul>	<ul style="list-style-type: none"> <li>Systemic thinking and handling of complexity</li> <li>Anticipatory thinking</li> <li>Critical thinking</li> <li>Interdisciplinary thinking</li> <li>Strategic thinking</li> <li>Normative and evaluative thinking</li> </ul>	<ul style="list-style-type: none"> <li>Self-awareness</li> <li>Acting fairly and ecologically</li> <li>Collaboration</li> <li>Cooperation in (heterogeneous) groups</li> <li>Participation in political processes</li> <li>Change of perspective</li> <li>Communication and use of media</li> <li>Tolerating ambiguity and uncertainty</li> </ul>	<ul style="list-style-type: none"> <li>Planning and realising innovative projects</li> <li>Skills for sustainable practices in different disciplines: architecture, design, agriculture, urbanism, etc.</li> <li>Skills needed to engage in a green economy</li> <li>Skills for civic engagement</li> </ul>	<ul style="list-style-type: none"> <li>Responsibility for future generations</li> <li>Appreciation and respect for the planet</li> <li>Respect for other knowledge systems</li> <li>Appreciation of diversity</li> <li>Empathy for and solidarity with the disadvantaged</li> <li>Care for the common good</li> </ul>

88. Key competencies (which cut across the categories above):

- Systems thinking competence: the ability to recognise and understand relationships, to analyse complex systems, to think of how systems are embedded within different domains and different scales and to deal with uncertainty
- Anticipatory competence: the ability to understand and evaluate multiple futures – possible, probable and desirable, to create own visions for the future, to apply the precautionary principle, to assess the consequences of actions and to deal with risks and changes
- Normative competence: the ability to understand and reflect on the norms and values that underlie one’s actions and to negotiate sustainability values, principles, goals, and targets – in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions
- Strategic competence: the ability to collectively develop and implement actions that further sustainability at the local level and further afield
- Collaboration competence: the ability to learn from others, to understand the needs, perspectives and actions of others, to deal with conflicts in a group and to facilitate collaborative and participatory problem solving
- Critical thinking competence: the ability to question norms, practices and opinions, to reflect on own one’s values, perceptions and actions and to take a position in the sustainability discourse
- Self-awareness competence: the ability to reflect on one’s own role in the local community and (global) society, to continually evaluate and further motivate one’s actions and to deal with one’s feelings and desires.
- Integrated problem-solving competence: the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable solution options – integrating the before mentioned competencies.

89. Promoting peace and sustainable development through education is one of UNESCO’s core missions and is now enshrined in **Sustainable Development Goal (SDG) Target 4.7**<sup>5</sup> as one of the goals which nations around the globe aspire to achieve.

90. There is a need to ensure education systems help build peaceful and sustainable societies. This includes integrating education for peace, sustainable development and global citizenship, as and when appropriate, across the entire education system. This is critical not only to achieve SDG 4.7 but also to support the implementation of all 17 SDGs.

91. Over the past several decades, there have been numerous calls for integrating education for peace and sustainable development into education systems (for example in the context of the UN Decade of Education for Sustainable Development, 2005-2014), and various programmes, initiatives and projects have been implemented. Nevertheless, there is no systematic review of the extent to which education for

---

<sup>5</sup> SD 4.7 reads as follows: “by 2030 ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture’s contribution to sustainable development” (United Nations, 2015).



peace and sustainable development is integrated in education policy, curricula, teacher education and assessment.

92. Given that the proposed global indicator for SDG Target 4.7 is “extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in (a) national education policies (b) curricula (c) teacher education and (d) student assessment”, it is especially pertinent to assess the extent to which Global Citizenship Education (GCED) and Education for Sustainable Development (ESD) are embedded in these aspects to establish a baseline against which progress towards achieving this target can be monitored over the next 15 years.

93. The UNESCO Section for Education for Sustainable Development and Global Citizenships is monitoring Target 4.7. It uses an existing reporting mechanism on the *UNESCO Recommendation concerning Education for International Understanding, Co-operation and Peace and Education relating to Human Rights and Fundamental Freedoms (adopted in 1974 by the 18th UNESCO General Conference)* to identify the extent to which ESD and GCED are mainstreamed across reporting countries in: (i) national education policy; (ii) curricula; (iii) teacher education; (iv) student assessments; and, (v) countries where “sustainable development”, “global understanding” or “international understanding” policy/plan/law is in place. UNESCO commissioned a review of past country reports on the implementation of the 1974 Recommendation for the reporting cycles for which data are available (cycles 3-5). 94 reports were analysed (35 from 2005-2008 and 57 from 2009-2016)

94. Several research project support the monitoring of target 4.7. Among others, the UNESCO Mahatma Gandhi Institute of Education for Peace and Sustainable Development (MGIEP) is conducting an international project to review the extent to which GCED and ESD<sup>6</sup> are mainstreamed in national policies and curricula in 20 (tbc) countries in Asia, with a particular focus on core subjects (mathematics, science, languages, and social studies) at primary and secondary school levels. The project was launched by UNESCO MGIEP in partnership with UNESCO Regional Bureau for Asia and the Pacific (UNESCO Bangkok) and field offices in the region. Among the four areas included in the proposed global indicator of SDG 4.7, the study will focus primarily on policies and curricula. Where possible, textbooks may be examined as well. The state of GCED and ESD in teacher education and student assessment will be examined by other related projects.

---

<sup>6</sup> GCED and ESD are broadly understood as including education for peace and human rights, education for sustainable consumption and responsible lifestyles, environmental education, education for international understanding, global education, global learning and so on.

**4. Innovation**

**A) Mr Guillermo José Aguirre-Esponda, Grupo Aguirre – Innovalia**

<b>Innovation</b>		<b>Knowledge</b>			<b>Skills</b>			<b>Values &amp; Attitudes</b>	
		<b>Formative</b>	<b>Inter-Disciplinary</b>	<b>Practical</b>	<b>Cognitive &amp; Meta-Cognitive</b>	<b>Social and Emotional</b>	<b>Physical &amp; Practical</b>	<b>Values</b>	<b>Attitudes</b>
<b>Inventive*</b>	Ideation	Understanding how things work	Design Thinking	Use of Computers	Intelligent guessing and decision making	Inter-cultural collaboration	Ability to overcome failure	Wisdom Courage Audacity	Realizing ours is a “designed world”
	Experimental	Design of experiments	TRIZ* Techniques	Rapid Prototyping and Testing	Ability to propose and validate sound hypothesis	Ability to learn from every attempt and failure	Ability to learn from games and other techniques	Boldness Integrity Patience	Willingness to try new approaches
<b>Constructive*</b>	Design	Design Techniques	Design Science Problem Solving (Triz) Theory of Evolution	Application of optimization tools and techniques	Benchmarking Studies Market Studies	Capacity to Convince Leadership	Resilience, Ability to work long hours	Endeavour Perseverance Firmness	That of a Surgeon performing critical surgery
	Development	Math’s, Biology and Engineering Methods	Material Science Robust Design (Taguchi)	Ability to make quick ball-park estimations	Project Management	Ability to follow methodologies	Ability to lead	Constancy Endurance	Flexibility for allowing others to lead
	Venture	Planning Finances Marketing	Integrating financial support for technical proposals	Fast Effective Search for relevant information	Ability to detect business opportunities	Negotiating Speaking different languages	Ability to sell ideas	Determination Resolution	Disposition to take business risk
	Value Creation	Entrepreneurial business techniques	Social Innovation and fund	Targeting Memorable-Transcendent	Capacity to prepare and deliver	Soft Human Skills	Bargaining	Commitment Responsibility	Willingness to share and to make an

			raising	t Objectives	convincing presentations			Presence of Mind	impact in the world
--	--	--	---------	--------------	--------------------------	--	--	------------------	---------------------

\*Inventive innovation is aimed at generating new ideas or solving a given problem.

\*Constructive innovation involves converting a given solution or idea into a practical product, service or process.

\*Problem solving analysis and forecasting tool derived from the study of patterns of invention in the global patent literature (Hua et al 2006)

## Introduction

95. As new sources of growth are urgently sought, – which involves the creation and diffusion of new products, processes and methods – innovation appears to be a critical part of the solution (Bloom, 2012; Andrews, 2015). The extraordinary stories of innovation staged the likes of Steve Jobs, Elon Musk or Bill Gates have captured the world imagination, and triggered many governmental and social initiatives aiming at fostering innovation, entrepreneurship and business incubation, including those promoted by the OECD (Borins, 2001).

96. Innovation is a very broad, complex and relatively new concept and almost all the attempts to define it point to a process that starts with an idea or discovery, and gets implemented through the vision, grit or drive of a single individual that builds throughout collaboration and ends having an effect perceived all over the world and a substantial impact through parts of it.

97. A number of frameworks have been used to characterize innovation. Generally, these approaches for categorizing innovation consider the sources of innovation from past successes or attempts to identify where to look for new innovation in the future (Carayanis, 2008). There is a way of characterizing innovation that has the potential for making a profound impact when dealing with the subject of educating for innovation (Frenz, 2009). It is the characterization of innovation when observed from the perspective of the skills, attitudes, knowledge and values that are involved in innovation. From this perspective, two vastly different expressions of innovation can be identified: inventive innovation and constructive innovation.

- **Inventive innovation** involves generating new ideas or finding solutions to a given problem and creating a proof of concept.
- **Constructive innovation** involves converting a given solution or idea into a practical product, service or process.

### BOX 1 – William Sims and the “Continuous Aim Fire”

By 1900 William Sims was a young Lieutenant, fresh off staff duty in Europe as an intelligence officer. He was sent to China to join the U.S. Navy’s newest and most powerful battleship, the USS Kentucky. It was while steaming through the South China Sea that he met a man from the British Royal Navy who would serve as his inspiration. Percy Scott was a British Admiral in charge of the HMS Terrible and he was well known for encouraging his men to try new ideas. Through his encouragement, his men developed something that he called “continuous aim fire” and it would revolutionize naval warfare.

Now, gunnery hadn’t changed much since the days of USS Constitution battling it out with the British frigates in the War of 1812. The gun director would estimate the distance to the enemy ship, set the elevation of the gun, and then each time the ship rolled he tried to time the firing so that the shell would hit the enemy. The technique was the reason why most sea battles in the age of sail took place at very close range. This was neither a very accurate way to shoot, nor a very rapid way to engage the enemy. Scott’s men had re-gearred the elevation mechanism on their heavy guns and added telescopic sights. The new gearing allowed the gun directors to move the gun continually as the ship rolled, and the new sights allowed them to keep the weapon aimed directly at the enemy ship. This meant that gun crews could fire as fast as they could reload.

Sims was invited by Scott to a demonstration of the improved and far superior “continuous aim fire”. He watched the HMS Terrible conduct gunnery practice and he realized this new technique would change naval warfare. A battleship using “continuous aim fire” could take on an entire squadron of enemy that

wasn't. Accuracy increased dramatically and the rate of fire could quadruple, which resulted in hit rates that increased over 1000% on some ships. Sims immediately sent a report back to the Bureau of Ordnance. He then struggled and fought for two years trying to convey this vision, as he is rejected by most of the authorities and his colleges. He did not give up and willingly risked everything he had until, with the help of President Roosevelt, the Navy adopted the new "continuous aim fire" and ended up dominating battle at sea during WW1.

President Roosevelt instituted a federal program to install the "continuous aim fire" in every ship of the American Navy and Sims became official firing inspector of the program.

98. The benefits of characterising innovation this way will be illustrated by analysing Williams Sims's famous story (Kitsune 2012) (see Box 1). The two expressions of innovations are clearly illustrated in the story:

1. Inventive Innovation in William Sims Story:
  - a. The British invented the "continuous aim fire".
  - b. The "continuous aim fire" did nothing to enhance the competitiveness of the British Navy, as they did not implement it until many years later, when almost all other armies had it already.
  - c. The invention was due to great extent to the freedom and encouragement to try new ideas promoted by Admiral Scott.
2. Constructive Innovation:
  - a. Lieutenant Sims on the other hand, did not invent anything.
  - b. He had the vision to understand the advantages that the "continuous aim fire" would represent to his own Navy.
  - c. He faced a generalized rejection at every level he tried. He fought this rejection and had the drive and grit to pursue his vision at all cost.
  - d. He did not succeed until he convinced the President of the United States to implement the "continuous aim fire".
  - e. After President Theodore Roosevelt committed to having the "continuous aim fire" installed in every ship of the American Navy, Sims became the official inspector of a full-fledged program to modernize the firing capabilities on the American navy.
  - f. Many thousands of all old-design cannons were scraped, gun directors, officials and seamen had to be trained in the new firing techniques, and millions of dollars were spent in new weapons.
  - g. During the First World War, the American Navy had a vast superiority over almost all other navies.

99. **Inventive Innovation:** The inventive expression of innovation is one of discovery, promising ideas, enthusiasm and shared optimism, mainly dependant on creativity and inspiration. It primarily requires freedom to experiment, a disposition to learn from failures, the willingness to start again and boundless enthusiasm (Galvin, 2012).

1. It is the result of a natural human inclination to improve, to explore new ways.
2. Taking risks is not a constraint.
3. Failure is not penalized and has no negative consequences.
4. Speed and the number of ideas generated and tested is critical.
5. Having the support of local management is crucial.
6. The end result is a "proof-of-concept" prototype.

**100. Constructive Innovation:** The constructive expression of innovation frequently has to overcome rejection. It normally requires the commitment of a significant amount of resources and thus, commitment at the highest level. It's more a matter of teamwork than individual effort, although it is almost always driven by a key individual. Consequently, what is most needed is the ability to convince others, to lead, to work together, generate a group commitment, to divide the tasks constructively and to use wisely the knowledge and resources available (McAdam, 2004).

1. It often faces widespread rejection.
2. It is a process oriented to reduce or eliminate risk.
3. Failure can have significant negative consequences.
4. Having clear goals and means to filter out foul ideas is critical.
5. Commitment at the highest level is crucial.
6. The end result is a practical, affordable, reliable solution that creates value.

101. In the history of mankind, only a few individuals have been able to master both innovative and constructive innovation: Composers who create musical masterpieces, architects capable of building their master works, inventors who can develop practical products and major technological innovations that change life as we know it (Ritter 2014).

102. In order to help the world move to a stronger, more inclusive and sustainable growth path, we need more individuals capable of managing both the inventive and constructive expressions of innovation. There are many frustrated inventive innovators and many constructive innovators lacking ideas, but very few integral innovators. Educating on innovation can generate such individuals.

### **Innovation through the lens of four principles**

#### ***Relevant towards 2030***

103. Innovation underpins the growth and dynamism of all economies and is particularly important for future growth (Braconier, et al, 2014). Moreover, as a key driver of productivity growth, innovation leads to value creation that generates knowledge-based capital.

104. Previous expressions of innovation throughout history have depended upon our good fortune. As we near 2030 and beyond our dependency from innovation will escalate and will not be optional. We need a more reliable and predictable process of innovation as we will not be able to depend upon randomly occurring innovations. In the near future the results of innovation will be scheduled into our economies.

105. Thanks to the availability of communications technology for a large part of humanity, opening possibilities that were previously impossible, we will be able to educate the individuals needed for the scheduled innovation in our future.

#### ***Impactful***

106. Innovation is the way future is anticipated and shaped. It is inherent to the human race and opens up *opportunities for those who lack capital; it is not confined to those with economic power. Innovation has the potential to stimulate growth where it is most needed.*

107. Individuals prepared to innovate will be more likely to transcend, by achieving the full expression of their dreams and vision. Integral Innovation enables individuals to make substantial contributions to society, based on their creativity, inspiration and their capacity to execute or get their dreams properly executed. Integral innovation can contribute to close the economic, technological or social gaps between regions and social classes (Thorvaldur 2001).

***Malleable***

108. One of the fundamental questions regarding innovation is still a matter of debate: Is the ability to innovate genetic, social or cultural? On the other hand, the possibility of teaching innovation in the same way as other subjects has not been universally welcomed (Smith 2005). Now, how to develop a competency to innovate/innovativeness? And as it can be seen in Table above, most of the constructs that made integral innovation are malleable. Trying to educate innovation as a single unit rationally is impossible because it combines concepts that are inherently conflicted. Until we regard the existence of both Inventive and Constructive Innovation it will become malleable.

109. Educating on **Inventive Innovation** requires stimulating environments, creative spaces and experiences, supporting means and technology for prototyping and testing, encouragement to fail and to learn from every failure, motivation to compete, to win and to start over if not, time and space for playing games and going through simulations that stimulates and encourages risk taking (Hodgkinson, 2013). Some of the requirements include:

1. The availability of open spaces for fostering creativity
2. Means and techniques for performing fast ball-park estimations
3. Means for building/testing prototypes
4. Multidisciplinary competitions and sudden design challenges
5. Teaching/implementing creativity-inducing non prescriptive methodologies
6. Encouraging a bold, all challenging risk-taking attitude

110. Education on **Constructive innovation** could be done through the execution of multidisciplinary open ended projects (Harvard, 2006). Some of the infrastructure that promotes Constructive Innovation includes: meeting rooms and project development rooms, white boards large enough to capture and visualize team members' input, laboratories for developing, constructing and testing complex prototypes, these being material or virtual.

1. Formal Design and Project Management courses for all disciplines.
2. Means for executing complete projects.
3. Means for Simulating/Modelling complex processes.
4. Participating in challenging, open, well know competitions.
5. Teaching/implementing rigorous non-prescriptive design methodologies.
6. A "Surgeon's" attitude.
  - a) Measurable

111. Most of the knowledge and skills required to educate individuals in Innovation are not specific to this discipline, they have been developed for similar uses, and have assessment techniques already in place for measuring the progress in said competencies. Education on innovation will start with the existing techniques and will quickly develop its own as it is required by the process.

112. When measuring the outcome of Innovation projects in the education process, the measurements in the Oslo and Frascati manuals will be applied.

***The Education 2030 taxonomy and curriculum redesign, implementation and assessment***

113. Taxonomically innovation can be described as sitting at the crossroads between the Arts and Science. Education on Integral innovation, composed of Inventive and Constructive innovation, can be understood as composed of five complementary elements:

1. **Competencies: Inventive and Constructive Innovation**, the ability to integrate new, untried ideas and concepts and applying them to existing or desirable situations.
2. **Knowledge: Design Science**, integrating the fundamentals and principles that help designer successfully undertake the challenge of expressing an idea or concept into the manufacturing specification for building or constructing a practical, reliable and affordable product, service or process.
3. **Skills: Product Development** – The ability to transform the design output into a complete manufacturing facility to build enough numbers of the products, deliver the services or run the process already designed.
4. **Attitude and Values: Entrepreneurship** – the ability to create an enterprise capable of selling and supplying the finished products, services or processes to their customers.
5. **Action: Value Creation** - the operation of the enterprise, and its ramifications to create as much value to society as possible, sometimes this will involve taking care of recycling or disposing of waste and the product at the end of its life.

114. The ultimate goal of education on innovation should be to create value translated into wealth and/or well-being of society.



## B) Mr Horii Hideyuki, iSchool, Tokyo University

Knowledge			Skills		Attitudes & Values
Disciplinary / learning areas	Inter-disciplinary / cross curricular	Practical	Cognitive & meta-cognitive	Social & emotional	
<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• Social Science</li> <li>• Collective Intelligence Service</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• Concept of human-centered innovation</li> <li>• Concept of abduction (creative thinking)</li> <li>• Concept of analogical thinking</li> <li>• Superficial similarity and structural similarity</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• Process of innovation</li> <li>• Design methodology for innovation</li> <li>• Mechanism for novelty</li> <li>• Methods for Categorization</li> </ul>	<p><i>Constructs</i></p> <p><u>Associative thinking</u></p> <ul style="list-style-type: none"> <li>• To categorize things based on structural similarity</li> <li>• To represent the structural similarity with category titles</li> </ul> <p><u>Creative thinking</u> To create ideas based on analogical thinking</p> <p><u>Evaluation</u> To evaluate novelty, effectiveness, and feasibility of ideas</p> <p><u>Presentation</u> To present ideas effectively</p> <p><u>Meta-cognition</u> Meta-cognition on workshop process and skills in</p>	<p><i>Constructs</i></p> <p><u>Communication</u></p> <ul style="list-style-type: none"> <li>• Listening other member's idea and presenting one's own idea</li> <li>• Improving one's way of thinking based on group communication</li> </ul>	<p><i>Constructs</i></p> <p><u>Positive attitude towards novelty</u></p> <ul style="list-style-type: none"> <li>• "Idea creation is not a special activity and everyone can create idea"</li> <li>• "Idea creation is a fun."</li> <li>• "New ideas have chances to provide values which cannot be provided by the traditional way."</li> </ul> <p><u>Confidence on cognitive skills</u></p> <ul style="list-style-type: none"> <li>• "Quality of ideas can be improved by following designed process"</li> <li>• "Complex things can be handled by categorization."</li> <li>• "Idea can be created easily based on analogical thinking"</li> </ul> <p><u>Value of diversity</u> "Others have different knowledge and skills"</p>

EDU/EDPC/RD(2016)38

			innovation workshop		from mine. That is why others can do what I cannot do. I can be different from others. That is why I can do what other cannot do.”
--	--	--	---------------------	--	--

## Introduction

115. i.school is an educational program to develop the ability to create innovative ideas of products, services, business models and social systems. It started in 2009. The i.school's educational program is composed of workshops for 20-30 participants. Seven or eight workshops are held a year, including intensive workshops held during summer vacations etc. and term time workshops held once a week in three hours for ten weeks. Each workshop has a different theme and method, but common to each is a focus on group work in four or five groups. Students of the University of Tokyo can apply from all sectors. Neither credits nor degrees are given. Participants' only purpose is self-improvement. Therefore, very motivated students take part. **The goals for i.school students are 1) when presented with a task requiring creativity, to learn how to design the most appropriate workshop process, and 2) to build up successful experience of creating innovative ideas leading to self-confidence.**

116. We have been testing educational programs to make young people innovative. What we can do is to analyse each educational program, that is the workshop for our case, and to identify the knowledge, skills, attitudes and values that participants gain through the workshop. We are not quite sure if they are "the knowledge, skills, attitudes and values that young people need to be innovative". But we are sure that participants of our workshops become innovative. We have never measured it while we have been preparing.

117. The table presented above is one example of "the knowledge, skills, attitudes and values that participants should gain" from a typical i.school workshop. What we should do is to do the same thing for all other workshops that we think effective, structure the derived knowledge, skills, attitudes and values, and present the integrated knowledge, skills, attitudes and values.

## Innovation through the lens of four principles

### *Relevant towards 2030*

118. Due to globalization and commoditization, innovation is required all over the world. Because of internet, having knowledge is not as important as before. Most intellectual work will be replaced by AI. The only unique competency of human being will be creativity and ability to make innovation happen. Hence, the competency of "innovation" is the key in the future society.

### *Impactful*

119. "The innovator's DNA: Mastering the five skills of disruptive innovators" by J. Dyer, H. Gregersen and C.M. Christensen presented five skills common in about 100 innovators and many founders and CEO of innovative companies. The five skills are the competency for "innovation" and the innovations created by the interviewee imply the impact by the competency of "innovation".

### *Measurable*

120. "The knowledge, skills, attitudes and values" that participants gain through innovation workshop can be identified. It is possible to measure "the knowledge, skills, attitudes and values" that each participant gained in the workshop. It is also possible to have a workshop to measure "the knowledge, skills, attitudes and values" of each participant.

## 5. Computational thinking/Programming/Coding - Ms Anja Balanskat, European Schoolnet

Knowledge			Skills			Attitudes & Values
Disciplinary / learning areas	Inter-disciplinary / cross curricular	Practical	Cognitive & meta-cognitive	Social & emotional	Physical & practical	
<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• Mathematics (concepts, processes, numeracy skills)</li> <li>• Science (concepts, modelling simulations)</li> <li>• Writing (literacy skills, structuring texts, programming as part of story- telling and creative writing)</li> <li>• Environment/ Geography (devise solutions to environmental problems)</li> <li>• Health, social and economic education (create presentations)</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• main content of computer science study</li> <li>• knowledge about computer programming languages</li> <li>• knowledge and understanding about technology and technological developments</li> <li>• theories, design principles</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• debugging, testing (programming)</li> <li>• coding (implementing solutions in a particular programming language)</li> <li>• design process (hypothesis, explore, experiment, analysis of problems and solutions, decomposition, evaluation, drawing conclusions, generalization)</li> <li>• sequencing</li> <li>• knowledge about how the machine works and human machine interaction</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• abstraction (key computational thinking skill)</li> <li>• modularising</li> <li>• predicting</li> <li>• algorithmic thinking</li> <li>• problem solving</li> <li>• creation of apps/program</li> <li>• logical thinking</li> <li>• analytical thinking</li> <li>• complex reasoning</li> <li>• making connections (between problems, subjects)</li> <li>• planning and organisation</li> <li>• creativity</li> <li>• precision (able to define steps, orders and tasks,</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• team work</li> <li>• communication</li> <li>• social collaboration</li> <li>• motivation and engagement</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• writing instruction</li> <li>• kinaesthetic</li> <li>• testing and debugging</li> <li>• experimenting and iterating</li> <li>• reusing and remixing</li> <li>• collecting, analysing and presenting data</li> <li>• using algorithms and procedures</li> <li>• making simulations, using models to simulate scenarios.</li> </ul>	<p><i>Constructs</i></p> <ul style="list-style-type: none"> <li>• confidence in dealing with complex systems</li> <li>• persistence in working with difficult problems</li> <li>• discover</li> <li>• innovate</li> <li>• create</li> <li>• way of self-expression, and self-discipline.</li> <li>• responsibility</li> <li>• social collaboration</li> <li>• openness (ability to handle open problems)</li> <li>• tinkering (experimentation and playing)</li> </ul>

or role playing games)			leaving no ambiguity) • concentration and focus • questioning			• connecting
------------------------	--	--	---	--	--	--------------

## Introduction<sup>7</sup>

121. Coding and programming in schools is not new. Already in the 80ies coding and programming was taught in U.S. schools mainly focusing on learning programming languages, but also for using computers for learning activities across the curriculum or designing software (Pea, Kurland, 1984). During the last 5 years, there is a renewed interest in these concepts, with an additional emerging focus on computational thinking. However, hard questions and the need for empirical evidence in this area remain: Why should students study computer programming? How should educational activities related to programming and coding be designed and assessed? What are the skills acquired when students code or program and are these skills transferable to other (subject) domains. In sum, is there any evidence that teaching those skills will actually benefit students? Can we justify the claim that coding and computing is a new (21<sup>st</sup> century) competence that needs to be taught at school or promoted via informal activities? Answers to these questions will support and inform current and future curriculum design.

## Programming/Coding through the lens of four principles

### *Relevant towards 2030*

122. There are two important drivers, societal and economic, for the development of programming, coding or computational thinking skills amongst young people. The main rationale for the (re) introduction of these competencies in schools is mainly to foster 21st century competencies to participate fully in the society and the labour market.

123. Firstly, today's society is characterised by a continuous influx of ICT, which are extensively used by young people. Schools and parents face the challenge to teach young people to responsibly use these technologies. During the last 20 years substantial efforts have been therefore made to develop students' media and information literacy (MIL)<sup>8</sup> (UNESCO, 2011) and/or digital competence<sup>9</sup> in schools. These concepts include the capacity to seek, evaluate, use and create information. IML focuses on the use of all media and information channels whatever the means and technologies used; digital competence involves the use of ICT. However, in order for young people to successfully participate in the digital society, which is more and more complex, for learning, pleasure or work, the education sector seeks to teach new competencies reflecting new demands. Students do not only need to know how to use the internet, social media, applications, software tools or a variety of devices, but are increasingly asked to understand the underlying principles of the computer, the interactions between the computer and the human, technological developments and be creators of digital artefacts. **Coding, programming and the wider concept of computational thinking reflects the need to understand the world around us by using computational methods to develop problem solving strategies** (Balanskat & Engelhardt, 2015). Educators and policy makers increasingly see the teaching of coding, programming and computational thinking skills as a key

---

<sup>7</sup> Abbreviations: CT: Computational Thinking; MoE: Ministry of Education; ICT: Information and Communication Technology; STEM: Science, Technology, Engineering and Math; MIL: Media and information literacy CS: Computer science; VPL: Visual Programming language

<sup>8</sup> Media and Information Literacy are traditionally seen as separate and distinct fields. UNESCO's strategy brings together these two fields as a [combined set of competencies](#) (knowledge, skills and attitude) necessary for life and work today. MIL considers all forms of media and other information providers such as libraries, archive, museums and Internet irrespective of technologies used.

<sup>9</sup> Digital competence is one of the 8 key competences for Lifelong Learning by the European Union. It is a transversal key competence which, as such, enables us to acquire other key competences (e.g. language, mathematics, learning to learn, cultural awareness). A competence is comprised of knowledge, skills and attitudes. Digital competence, as defined in the European Digital Competence framework (DigComp), consists of information and data literacy, communication and collaboration, digital content creation, safety and problem solving. (Vuorikari, R. et.al, 2016)

21<sup>st</sup> century competence<sup>10</sup>, which support the development of transversal 21st century competencies such as problem solving skills, analytical and logic thinking or creativity. These are all skills required when students carry out programming or coding tasks. The (potential) transfer of cognitive skills (e.g. problem solving abilities) to other subjects or life situations is key to the claims for introducing computational thinking in compulsory curricula. Countries, such as Finland<sup>11</sup> and Portugal<sup>12</sup>, see the integration of coding and computational thinking in the curriculum also as a means to raise students' attainments and interest in specific subjects such as Mathematics or science subjects.

124. Secondly, there is a strong push from the IT sector to boost economic growth and innovation which asks for highly skilled software engineers and IT specialists. The forecast is that by 2020, Europe may experience a shortage of 800 000 professionals skilled in computing informatics (Balanskat & Engelhardt, 2015). Moreover, many other industries (e.g. medicine, energy, biotechnology, cinematography) are based on computer science and require computing. One underlying rationale for policy makers is to develop coding and programming skills of students to respond to these economic developments. The European Union via the New skills agenda (European Commission, 2016) also drives the development of digital skills for employability. Teaching coding and programming in schools is therefore seen as a way to raise students' interest in computing science. Moreover, as computing is a field that encapsulates aspects of maths, science and technology, it is also hoped that it can foster the interest in STEM studies.

125. A recent survey with Ministries of Education (Bocconi, et.al 2016- DRAFT) gives an overview of the underlying rationale for introducing computational thinking in the curriculum highlighting that the majority of MoE link the introduction of coding, programming or computational thinking to the development of students' logical thinking and problem-solving skills.

**Table 1. Rationale for integrating CT in the curriculum (Bocconi, et.al 2016- DRAFT)**

	Austria	Czech Republic	Denmark	Estonia	Finland	France	Greece	Hungary	Italy	Lithuania	Poland	Portugal	Switzerland	Turkey
Fostering logical thinking skills														
Fostering problem solving skills														
Fostering other key competences														
Attracting more students into Computer Science														
Fostering coding and programming skills														

<sup>10</sup> Experts consider computational thinking as a competence: “We know from research that an important attitude for CT, which goes with this set of skills, is that students are able to work with uncertainty in complex situations, as well as having to be precise. Hence, there certainly are a number of attitudes that are also being developed while developing CT skills; for this reason, speaking of CT as a competence is reasonable.” (Voogt in Bocconi, 2016).

<sup>11</sup> Finland integrates coding in all grades of basic education from grade 1 to grade 9.

<sup>12</sup> The Portuguese curriculum mentions computational thinking as a learning outcome for students at lower secondary education, grades 7 and 8. In 2015 -2016 the MoE launched a pilot





131. A study carried out in Spain (Calao et al. 2015) measured to what extent students are prepared to learn coding at early stages and its impact on other subjects. The results of the quasi-experiment which lasted 3 months with 42 6th grade students aged 11 or 12, showed that there is a statistically significant increase in the understanding of mathematical processes in the experimental group. During the initial stage of the experimental intervention, the experimental group began with several informal activities on sequences of processes, and then an introduction to the concepts of algorithm and programming was given. In a second stage, students began to learn to use the Scratch graphical programming environment, conducting educational activities. These activities were initially aimed at basic interactions with the program and then focused on the use of animated dialogues. In a third stage the use of loops, conditionals and variables was trained. Finally, in a fourth stage, the students tested their creativity by programming their own games and simulations making use of images, sounds and movements. The control group continued the classes using the same kind of methodology and activities they had been using up until that moment.

132. Evidence as regards the acquisition of the skills mentioned above, problem solving skills, or coding and programming skills are strongly related to the assessment of those skills. The study on Computational Thinking (Bocconi, et.al 2016, p. 28, Draft) concludes that *“There is still a limited number of research works mainly aiming at investigating the acquisition of CT concepts and constructs, as well as their transfer (if any) to other knowledge domains.”*

133. Researchers (Grover and Pea, 2013, Grover 2014) agree that we need to further investigate the type of skills students acquire when exposed to a coding, programming or CT curriculum, how are they assessed and what are the results of these assessment. The way coding, programming and CT are taught in schools should be underpinned by solid pedagogical approaches. Simon Peyton and Jones (in Bocconi 2016) discuss the need to undertake research to evaluate the effectiveness of different approaches of teaching programming and CT in schools. Experts already agree (In Bocconi, 2016) that schools should encourage connections across the curriculum, making the transfer of knowledge and skills between domains explicit to students, provide multiple pathways to acquiring computational thinking skills and offer activities that are engaging, lively and relating to real life situations, and combine a physical activity with problem solving.

134. There is not sufficient evidence yet concerning the long term impacts of studying coding/programming or computational thinking in schools or showing a direct relationship between having followed these activities in or outside schools and the take up of related STEM studies. The Testing Algorithmic and Application Skills (TAaAS) project launched in the 2011/2012 academic year tested first year students of Informatics. The results of the tests clearly show that students start their studies in Informatics with underdeveloped algorithmic skills, only a very few of them reaching the level of extended abstract. It was found that the students, almost exclusively, only consider traditional programming environments appropriate for developing computational thinking, algorithmic skills. Furthermore, they do not apply concept and algorithmic based methods in non-traditional computer related activities, and as such, mainly carry out ineffective surface approach methods, as practiced in primary and secondary education. This would explain the gap between the expectations of tertiary education, the students' results in the school leaving exams, and their overestimation of their knowledge, all of which lead to the extremely high attrition rates in Informatics (Csernoch, et al. 2015). If educational policy makers pursue the aim of attracting more students to computer science studies and have more graduates in this area available for the job market, this kind of evidence needs to inform current curriculum design.

### *Malleable*

135. In order to identify how coding, programming skills can be acquired through the process of learning at different ages we need to define what they actually mean and include the concept of computational thinking.

136. “**Coding** and **programming** are often used interchangeably to indicate the process of ‘writing’ instructions for a computer to execute. However, *programming* refers to the broader activity of analysing a problem, designing a solution and implementing it. *Coding* is the stage of implementing solutions in a particular programming language.” (Duncan 2014, in Bocconi, 2016)

137. “**Computational thinking** is typically associated with coding and computer programming, but is also more than that, involving “solving problems”, designing systems and understanding human behaviours (Balanskat & Engelhardt, 2015).

138. “**Computer Science**” designates the discipline which teaches the principles of information and computation. Computer science (as opposed to ICT with a focus on the use of computer related products) is about the creation of “new products” related to computers such as hardware, software, tools, programs and software, algorithms, concepts and theories.

### *Country examples on how to teach coding/programming*

139. Computational thinking developed through the study of computer science can serve as a methodology for all students across disciplines and improve the understanding of the role of computing in modern society (Balanskat & Engelhardt, 2015). There a variety of curriculum integration examples of how coding, programming, or computational thinking is currently aimed to be taught in schools (Europe and worldwide): Introducing CT concepts related skills in compulsory education ought to enable students to use computational tools to express themselves, solve problems, represent knowledge and construct models and simulations (Bocconi, et al. 2016).

140. Coding, programming and CT skills are developed mainly based on tools and software, e.g. software education programs: developing CT and coding skills, and creative expression through software (pilot in South Korea). A number of countries (Slovakia, England, and France) integrate coding in the learning process for all learners from primary to secondary following a gradual approach starting from simpler tasks using child friendly programming tools with the ability to visualise or via robot construction kits. Only at later levels, upper secondary school, programming languages are introduced in Slovakia. Students in first year primary school in France learn to code movements in space using suitable software programs. The approach is complemented in Maths lessons aiming at the understanding and production of simple algorithms in year 2. Programming as such is only introduced in the 3<sup>rd</sup> year by teaching abstraction. In lower secondary school algorithmic is the basic development for logical thinking (Bocconi, et al. 2016).

141. The new curricula in Finland (2016-2018) introduce “algorithmic thinking” and “programming” as a mandatory cross-curricular activity from the first year of school onwards. **They are seen as a new learning skill to complement reading, writing, drawing, and calculating.** A relevant aspect of the new core curriculum is the development of problem solving skills in the context of real life problems. In the first years of primary schools programming is taught transversally. Students will first get introduced to step-by-step introductions, then visual programming,<sup>13</sup> then programming itself (not starting directly with

---

<sup>13</sup> In [computing](https://en.wikipedia.org/wiki/Visual_programming_language), a **visual programming language (VPL)** is any [programming language](https://en.wikipedia.org/wiki/Visual_programming_language) that lets users create [programs](https://en.wikipedia.org/wiki/Visual_programming_language) by manipulating program elements graphically rather than by specifying them textually. [https://en.wikipedia.org/wiki/Visual\\_programming\\_language](https://en.wikipedia.org/wiki/Visual_programming_language)

programming). Students will gradually progress from simpler to more complex tasks – with visual programming as an excellent innovation that supports this process. The formal teaching of algorithmic thinking is only made in grades 7-9 (Bocconi, et al. 2016).

142. To the contrary, in England, 5-6 years old will be already learning what algorithms<sup>14</sup> are, but not always using computers. A set of instructions can be illustrated by using recipes.<sup>15</sup> Children will be learning what algorithms are, which will not always involve computers. When explained as “a set of instructions” teachers may illustrate the idea using recipes, or by breaking down the steps of children’s morning routines (Berry, 2013). They also learn how to create and debug simple programs. 7-11 years old will create and debug more complicated programs and introduced to concepts such as “sequence, selection and repetition. 11-14 years old will be using two or more programming languages (at least on textual) to create their own programs). At all these stages children will be getting familiar with digital competence (use of the Internet and services) and how to use the web responsibly. (Department of Education, England, 2013).

143. In general, the introduction of the computing subject in England comprises next to Computer Science (teaching principles of computation and putting them into practice via programming), and Information Technology (the use of ICT to create programs), the concept of Digital Literacy. The latter ensures that pupils are able to use, and express themselves and develop their ideas through, information and communication technology – at a level suitable for the future workplace and as active participants in a digital world. (Berry, 2013)

*Research evidence on how best to learn coding, programming and computational thinking*

144. The literature is twofold about the right moment of introducing programming and CT. Some authors highlight that the introduction of CT & programming at the primary school level calls for empirical research on “what is the earliest age in which students can handle abstraction, and specifically do abstraction (Armoni & Gal-Ezer, 2014, in Bocconi, 2016). Other authors conceptualize CT as more aligned with language and literacy and especially the writing part of literacy. In their view programming is a form of writing to express oneself with computational media (Bocconi, 2016).

145. Moreover, programming is not easy; the choice of the programming environment can greatly influence the task and choosing the relevant programming language or programming environment can be difficult for teachers. Duncan (2014) provides an analysis of 47 initial learning environments (ILE)<sup>16</sup> for programming at school from kindergarten to upper secondary school by establishing a heuristics that can be used to classify an Initial Learning Environment (ILE) (or programming languages) and assist teachers in choosing the right tools. These levels are intended to give an idea of the approximate age group, ability level and learning outcomes that each ILE is best suited for.<sup>17</sup>

146. With regards to the objectives of programming in a Computer Science curriculum several authors point to the need to expose students to more than one programming language (Armoni et al., 2015; Duncan & Bell, 2015; Grover et al., 2014; Peyton Jones, 2015 in Bocconi, 2016).

---

<sup>14</sup> An algorithm is a precisely defined procedure – a sequence of instructions, or a set of rules, for performing a specific task (e.g. instructions for changing a wheel or making a sandwich) (Berry, M. 2013)

<sup>15</sup> The English curriculum guidelines suggest to illustrate what algorithms are – a set of instructions to solve a problem- via projects, such as Making and editing a cookery video in which the algorithm of a recipe is clearly illustrated. <http://www.computingschool.org.uk/data/uploads/CASPrimaryComputing.pdf>

<sup>16</sup> With Initial Learning Environments (ILE) Duncan refers to tools that can be used for teaching programming and programming concepts to children

<sup>17</sup> Set of heuristics to classify an ILE according to Duncan (2014), p.65 <http://doi.org/10.1145/2670757.2670774>

147. The success of drag & drop visual programming environment like Alice and Scratch (Fincher & Utting, 2010), has also raised concerns on their suitability for learning CT skills in a Computer Science curriculum. “The drawback of these environments, however, is the risk that students come away without having learnt many (or any) programming, CS or CT concepts, or they may develop an incorrect model of what programming is” (Duncan, 2014 in Bocconi, 2016).

148. One argument for the integration of programming throughout all education levels is the development of problem solving skills in addition to logical reasoning. Kalelioglu, F. Gülbahar, Y. (2014), applying an explanatory sequential mixed method design with 48 primary school students, found that programming in the Scratch platform did not cause any significant differences in the problem solving skills of the primary school students. When students were asked about their experience, most of them liked programming, wanted to improve their skills and found the Scratch platform easy to use.

149. Unplugged activities- teaching computing without technology- involve problem solving to achieve a goal, and in the process dealing with fundamental concepts from CS. They are lively and engaging, and combine physical activity with problem solving.

150. Experts consulted in a recent study on CT from IPTS (Bocconi et al. 2016, draft) recommend **multiple pathways** to CT throughout compulsory education, to give learners the opportunity to **design, create and experiment** in areas they care about and base CT activities on **real life situations**.

### *Measurable*

151. We will only successfully integrate coding, computing, or computational thinking in the curriculum, if they are properly assessed. In order to do so, we need to identify what skills can be developed through programming and coding, and how they can be measured. The lack of tools to support educators in the assessment of students work was identified as one barrier to introduce computer programming in schools (Moreno. León, J, Robles, et al. 2015.)

### *Assessment in curricula*

152. Most countries, which integrated coding/programming in the curriculum also assess it, mainly as part of a general assessment of students during exams. In some countries this is done as part of project work (e.g. studying research on a computer science topic and work in teams (Ireland, Malta). If coding is integrated as a cross curricular approach in other subjects it is assessed as part of subject skills, although it is not clear to what extent. Estonia works on a test for assessing students’ digital (to be piloted in 2017) in order to ensure that relevant and sufficient knowledge and skills are obtained by the students. The national level test will include specific problem-based assignments that involve elements of different digital skills, attitudes and knowledge. Coding will not be assessed as part of this test, as it is not obligatory. In Finland as part of the new curriculum, seven competence areas were defined to be assessed as part of subject assessment thus combining competence based and subject based teaching and learning.<sup>18</sup> The English Computing quick start (Berry, 2015) provides important practical guidelines for primary teachers on how to assess coding, programming or computational thinking skills in new ways and which go beyond the assessment of purely technical skills - with a focus on assessing knowledge and understanding; or going beyond assessing simply the outputs - with a focus on assessing the learning that takes place in the process. It also provides examples for assessing individual contributions as part of collaborative work.

---

<sup>18</sup> Dimensions of broad-based competence (7), Thinking and learning; Cultural competence, interaction and expression; Looking after oneself, managing daily activities, safety; Multiliteracy; ICT competence; Competence required for working life and entrepreneurship; Participation, empowerment and responsibility

153. Blogs, for examples, can be powerful tools to showcasing, reflection and feedback. Pupils can be asked to use this to upload the outcomes of their work and document the computational thinking processes they worked through, focusing on any challenges they overcame. From the Scratch scripts themselves, evidence of achievement can be obtained such as to write programs that accomplish specific goals, use sequence in programs, work with various forms of input (e.g. keyboard and mouse), design programs that accomplish specific goals, design and create programs, use repetition in programs (forever loop, two different repeat until loops). The handbook also provides an interactive self- assessment tool for teachers to audit their computing knowledge and skills.<sup>19</sup>

#### *Outcomes from research*

154. Research reveals that assessment of coding, programming and CT skills is still underdeveloped both as regards to the assessment of the skills as well as regards the knowledge transfer.

155. Most strategies assess CT by analysing artefacts (e.g. games or models) developed by students. In this approach students are required to modify predesigns programs, add to existing code to accomplish a specific task. Troubleshooting tasks, e.g. debugging an existing program could be an effective way for assessing students' fluency in computer programming and computer based problem solving (Bocconi, 2016).

156. The research revealed tools and approaches used in education which measure:

- Students understanding of the programming environment, abstraction modelling and scale and whether students can apply algorithmic thinking<sup>20</sup> to solve problems; use of game patterns to show sophisticated understanding of the programming environment (Werner, Denner & Campe 2014, in Bocconi, 2016).
- The relation between final artefacts and predefined learning goals via pre and post tests and evaluations, computational models of students are evaluated against an expert model.
- Debugging capacities for measuring complex reasoning.
- Rephrasing computer science tasks from international competitions, e.g. the Bebras ([www.bebbras.org](http://www.bebbras.org), mini challenges using “cover stories” in a simple and colourful language easily understood by children to motivate students and assess their computational thinking skills (in Bocconi et.al, 2016).

157. Some researchers argue to combine several assessment methods to have a more comprehensive view (not only student created programs) in order to find a good balance between explanation tasks, demonstration of activities and hands on assignments.

158. There are various assessment tools available for educators, such as online assessment systems, which check students understanding and progress (Computing At School; project “Quantum”), project based evaluations tools, (Dr Scratch) which helps to evaluate CT skills acquired, or rubrics or multiple choice tests.

---

<sup>19</sup> [www.quickstartcomputing.org](http://www.quickstartcomputing.org)

<sup>20</sup> Algorithmic thinking is a way of getting to a solution through a clear definition of the steps. (Csizmadia et al., 2015).

**The Education 2030 taxonomy and curriculum redesign, implementation and assessment**

159. The decomposition of coding, programming and computational thinking skills will help curriculum designers to:

- i) Establish a clear and comprehensive overview of the underpinning knowledge, skills and attitudes of coding, programming and computational thinking competence.
- ii) Identify which aspects they would like to focus on in the curriculum (e.g. focus on the transfer of problem solving skills)
- iii) Identify evidence in this area and best practice
- iv) Formulate curricular goals and objectives
- v) Decide on the best ways for implementation and assessment (cross- curricula, subject based, age groups)
- vi) Evaluate progress made in these areas

**6. Financial Literacy - Ms Chiara Monticone, OECD Directorate for Financial and Enterprise Affairs**

		<b>Knowledge</b>		<b>Skills</b>	<b>Attitudes &amp; Values</b>
		<i>Disciplinary ('financial literacy' subject)*</i>	<i>Inter-disciplinary / cross curricular (including in mathematics, social sciences, economics, business, citizenship classes or others depending on national curriculum)*</i>	<i>Cognitive skills</i>	
<b>Money and transactions</b>	<ul style="list-style-type: none"> <li>• Understanding that money can be exchanged for goods or services.</li> <li>• Being aware that money spent on something is no longer available to be spent on something else.</li> </ul>	<ul style="list-style-type: none"> <li>• Understanding that money held as cash or in the bank loses value in real terms if there is inflation.</li> <li>• Being aware of the common forms of money, payment methods, and income sources</li> </ul>	<ul style="list-style-type: none"> <li>• Being able to recognise and count money (in own and foreign currency)</li> <li>• Being able to compare different ways of transferring money, making payments, and receiving money</li> <li>• Being able to use arithmetic to make choices based on price and quantity, check change and evaluate discounts</li> <li>• Being able to read and check financial documents, such as bank statements</li> </ul>	<ul style="list-style-type: none"> <li>• Being confident to talk about money matters with family and other trusted adults</li> <li>• Being confident to handle money and simple transactions</li> <li>• Being confident to make one's own spending decisions even if peers make different choices</li> <li>• Understanding that spending choices can have an ethical component and can impact on others</li> </ul>	

		<b>Knowledge</b>		<b>Skills</b>	<b>Attitudes &amp; Values</b>
		<i>Disciplinary ('financial literacy' subject)*</i>	<i>Inter-disciplinary / cross curricular (including in mathematics, social sciences, economics, business, citizenship classes or others depending on national curriculum)*</i>	<i>Cognitive skills</i>	
<b>Planning and managing finances</b>	<ul style="list-style-type: none"> <li>• Knowing the difference between needs and wants</li> <li>• Understanding the benefits of planning finances and keeping track of expenses</li> </ul>	<ul style="list-style-type: none"> <li>• Understanding the implications of saving and borrowing, and how they are affected by compound interest</li> </ul>	<ul style="list-style-type: none"> <li>• (Appreciating the importance of) living within one's means and paying debt on time</li> <li>• Being able to plan ahead for expenses expected to occur in the near future.</li> <li>• Being able to make informed decisions (possibly with parents) about saving and investment in further education</li> </ul>	<ul style="list-style-type: none"> <li>• Being confident to manage personal spending, saving and credit</li> <li>• Being motivated to save-up for a particular item or future event</li> <li>• Being prepared to delay gratification in order to gain more in the future</li> </ul>	
<b>Risk and reward</b>	<ul style="list-style-type: none"> <li>• Understanding that financial products can come with both risks and rewards, and that usually greater rewards are associated with higher risks</li> <li>• Understanding the importance of creating financial safety nets</li> </ul>	<ul style="list-style-type: none"> <li>• Having basic awareness of how saving and insurance products can help managing risk</li> </ul>	<ul style="list-style-type: none"> <li>• Being able to assess the relative risks and rewards of simple financial products, choices or business ventures</li> <li>• Being able to make informed decisions about the need for insurance when buying products or services</li> </ul>	<ul style="list-style-type: none"> <li>• Being cautious about making financial decisions hastily, or without having access to good quality information or advice about the risk and rewards.</li> <li>• Being confident to take some calculated financial risks.</li> </ul>	



		<b>Knowledge</b>		<b>Skills</b>	<b>Attitudes &amp; Values</b>
		<i>Disciplinary ('financial literacy' subject)*</i>	<i>Inter-disciplinary / cross curricular (including in mathematics, social sciences, economics, business, citizenship classes or others depending on national curriculum)*</i>	<i>Cognitive skills</i>	
Financial landscape					
			<ul style="list-style-type: none"> <li>• Being aware of financial regulation</li> <li>• Understanding the difference between impartial financial information, and marketing or advertising</li> <li>• Having a general understanding of how tax and benefits can impact one's own spending and saving decisions.</li> <li>• Understanding how a person's financial decisions can have consequences on others</li> </ul>	<ul style="list-style-type: none"> <li>• Being able to identify and compare information before buying a financial product or service</li> <li>• Taking care to keep personal data, passwords and money safe.</li> <li>• Being able to assess whether financial communication is genuine or potentially fraudulent</li> <li>• Being able to make complaints when necessary</li> </ul>	<ul style="list-style-type: none"> <li>• Being confident and motivated to apply rights and responsibilities as a consumer</li> </ul>

\* The distinction between disciplinary and interdisciplinary competencies is not to be intended in a strict sense, as all of them could be integrated in existing school subjects or could in principle be part of a separate 'financial literacy' subject.

## Introduction

160. In 2002, the OECD initiated a far-reaching financial education project to address governments' emerging concerns about the potential consequences of low levels of financial literacy. Recognizing the increasingly global nature of financial literacy and education issues, in 2008 the OECD created the International Network on Financial Education (INFE). The OECD/INFE now brings together more than 240 public institutions from more than 110 countries and economies, discussing the latest developments in their country, collecting evidence, and developing analytical and comparative studies, good practice, policy instruments and practical guidance on key financial education areas.

161. The first Recommendation of the OECD Council on financial education not only provided an internationally-recognised definition of financial education<sup>21</sup> but also advised that “financial education should start at school. People should be educated about financial matters as early as possible in their lives” (OECD, 2005). The Recommendation recognised the importance of teaching young people key life skills before they start to become active financial consumers and the relative efficiency of providing financial education in schools rather than attempting remedial actions in adulthood.

162. Since then, the OECD has endeavoured to collect further evidence on the financial literacy of young people and to develop guidance on ways to implement financial education initiatives for youth and in schools. In 2014, it published a report on Financial Education for Youth: the Role of Schools, which was welcomed by G20 leaders in September 2013 (OECD, 2014a). The publication discusses examples of introducing financial education in the school curriculum (see also Box 2) and includes guidelines for financial education in schools and guidance on financial education learning frameworks, which were supported by the Ministers of Finance of the Asia-Pacific Economic Cooperation (APEC) in August 2012.

163. Based on existing financial education learning frameworks (OECD, 2014a) and on the conceptualisation of financial literacy developed in the PISA assessment framework, the OECD/INFE developed in 2015 the Core competencies framework on financial literacy for youth (OECD, 2015a). This framework describes the basic level of financial literacy – in terms of knowledge, attitudes and skills – that is likely to be needed by young people between the ages of 15 and 18 to fully and safely participate in economic and financial life, taking into account outcomes that will be relevant to them immediately and in the near future.<sup>22</sup> The competencies are outcome-based and can be adapted to national circumstances and used in a flexible manner, taking into account differences in culture and context at the national or local level and across all sectors of the youth population. Some competencies may be more relevant than others depending on national social and cultural settings.

164. The financial literacy competencies presented in the table at the beginning of this chapter constitute a summary of the OECD/INFE Core competencies framework and have been adapted to the extent possible to the Education 2030 taxonomy; the original full set of competencies is available online.<sup>23</sup> The distinction between disciplinary and interdisciplinary competencies is not to be intended in a strict sense, as all of them could be integrated in existing school subjects or could in principle be part of a separate ‘financial literacy’ subject, if the curriculum was not overloaded. In the table, disciplinary

---

<sup>21</sup> Financial education “is the process by which financial consumers/investors improve their understanding of financial products, concepts and risks and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being” (OECD, 2005).

<sup>22</sup> The OECD/INFE developed an analogous Core competencies framework on financial literacy for adults (aged 18+) (OECD, 2016b).

<sup>23</sup> <http://www.oecd.org/finance/financial-education/Core-Competencies-Framework-Youth.pdf>

financial literacy competencies refer to competencies that would form the core of a distinct ‘financial literacy’ subject, while interdisciplinary competencies include those that can be incorporated more easily into other subjects, because they encompass mathematics operations or because they are linked to (macro)economics and the broader economic-financial context that may be covered in social sciences, economics, business or citizenships classes. Ultimately, where and how financial literacy topics can be integrated depends on the specific content of existing school subjects at the national level.

### **Financial literacy through the lens of four principles**

#### ***Relevant towards 2030***

165. In recent years, many countries and economies have become increasingly concerned about the level of financial literacy of their citizens of all ages. This has stemmed from shrinking public and private support systems, shifting demographic profiles including the ageing of the population, and wide-ranging developments in the financial marketplace. As a result, financial literacy is now globally acknowledged as an important element of economic and financial stability and development.

166. More specifically, policy makers have increasingly recognised the importance of developing financial literacy skills among young people, both for current and future young generations. Young people face immediate financial decisions; often, they are already consumers of financial services, such as bank accounts with access to online payment facilities. As they approach the end of compulsory education, young people in school also have to decide, with their parents, whether to continue with post-compulsory education and how to finance such education.

167. Recent trends are likely to make the need for financial literacy skills even more important in the future. First, future generations are likely to face more challenging financial choices, given the growing complexity in the financial products, services and systems available. Financial education will therefore have a role in equipping people with the financial literacy to understand complex products and services, choose the best ones for them, and protect themselves from financial mis-selling and abuse, in conjunction with financial consumer protection and regulation policies. The spread of digital financial services may open up new opportunities for poor and financially excluded people to access the formal financial system, but can also expose consumers to new security threats and fraud risks that are compounded when low financial literacy is combined with a lack of digital skills (G20/OECD-INFE, 2016). Second, future generations will probably bear more financial risks during their lives than the current generation, due to increased life expectancy, a decrease in welfare and occupational benefits, more ‘individualised’ pensions, and uncertain economic and job prospects. Third, growing income and wealth inequality will put socio-economically disadvantaged groups at further disadvantage, meaning that they will need financial literacy more than ever to be able to make informed financial decisions. Providing youth with financial education may help bridge financial literacy disparities due to differences in students’ socio-economic status. Finally, the financial crisis and recent cases of financial scams, banking fraud and tax avoidance spurred a growing demand for ethics in financial transactions at large (OECD, 2015b; Wehinger, 2013).

#### ***Impactful***

168. Existing empirical evidence shows a number of potential benefits of being financially literate. Studies that look at the correlation between the financial literacy of young people and their outcomes in adulthood are rare, but most studies on adults show an association between financial literacy and financial outcomes. There is mounting evidence that in developed countries higher financial literacy is associated with planning for retirement, savings, and wealth accumulation (Stango and Zinman 2009; van Rooij et al. 2012), better money management, greater stock market participation, greater portfolio diversification, and choosing products with lower fees (Hastings and Tejada-Ashton, 2008; Lusardi and Mitchell, 2011; Stango

and Zinman, 2009; van Rooij et al., 2011; Yoong, 2011; Graham et al. 2009; Choi et al. 2011). Higher levels of financial literacy have been found to be related not only to asset building but also to debt and debt management, with more financially literate individuals opting for less costly mortgages and avoiding high interest payments and additional fees (Gerardi et al., 2010; Lusardi and Tufano, 2009a, 2009b). In emerging economies, financial literacy is shown to be correlated with holding basic financial products, like bank accounts, and buying insurance (Xu and Zia, 2012).

### ***Malleable***

169. Growing research is showing that financial literacy can be improved through the process of learning. An increasing number of studies have focused on random assignment to financial education provision in school in order to pin down causal relationships and assess to what extent financial literacy can be improved through financial education.

170. A number of experimental or quasi-experimental studies, mostly on secondary school students, have provided encouraging results and showed that financial education programmes in school can increase students' financial literacy (Becchetti and Pisani, 2012; Romagnoli and Trifilidis, 2013; Luhrmann et al., 2012; Carlin and Robinson, 2010; Batty et al. 2015; Walstad et al., 2010). The evidence base on rigorously evaluated financial education programmes in school is not very large yet, and it is therefore difficult to clearly isolate success features. Box 1 describes the results of a pilot introducing financial education in Brazilian high schools on a large scale and highlights what made the programme effective.

#### **Box 1. Providing effective financial education in Brazilian schools**

The largest and most rigorous impact assessment of teaching financial education in schools to date was conducted in Brazil in 2010-2011. It used a randomised control trial to evaluate the impact of a pilot programme of financial education in high schools. Some 891 schools and 26 000 students in six states participated in the evaluation.

The financial education curriculum was developed by a team of education experts, psychologists and sociologists. The content includes innovative material designed to capture the interest of young adults and to be relevant to their lives. It consists of 72 case studies that can be integrated into regular school subjects, such as mathematics, Portuguese, science, geography and history. The textbook discusses such themes as family life, social life, personal property, work, entrepreneurship, large expenditures, the public good, the national economy and the world economy. Teacher guidelines explain how to integrate these case studies into the regular curriculum, and teachers have discretion over the order in which the cases are taught.

The results of the evaluation were positive (Bruhn et al., 2016). The average level of financial proficiency was statistically significantly higher among students who participated in these classes than among students who did not. The programme led to a 1.4 percentage-point increase in students reporting that they save for purchases, and a greater likelihood that students engage in financial planning and participate in household financial decisions. The level of financial autonomy (i.e. whether students felt empowered, confident and capable of making independent financial decisions and influencing the financial decisions of their families) and attitudes towards savings also improved. There were also positive effects on parents: the evaluation found an increase in financial knowledge among parents, more discussion of financial matters within families, and a larger number of families that drafted a household budget.

The success of the pilot hinged on several factors, including developing high-quality resources and teaching practices (materials were rigorously tested, and teachers were trained through workshops, DVDs and a guidebook); ensuring that the programme was engaging and relevant to the audience (using interactive material with practical exercises, making the content relevant to young people's lives, and encouraging students to try and practice new behaviours); focusing on both the acquisition of knowledge and on shaping attitudes; and involving students' families.

**Measurable**

171. The OECD and its INFE have developed various instruments to measure financial literacy both among adults and young people (OECD/INFE, 2015, 2016). In 2012, the OECD conducted the first internationally-comparable assessment of financial literacy among young people as part of the PISA survey, testing 15-year-old students in 18 countries and economies (OECD, 2013; 2014b).<sup>24</sup> The exercise was repeated in 2015 among 15 countries and economies (OECD, 2016a).<sup>25</sup>

172. Like other PISA domains, financial literacy is assessed using an instrument designed to provide data that are valid, reliable and interpretable. The PISA Assessment and Analytical Framework (OECD, 2016a) provides a comprehensive framework to assess the financial literacy of 15-year-old students. The financial literacy assessment framework considers financial literacy in terms of content, processes, and contexts. In particular, the four content areas for PISA financial literacy – that is the areas of knowledge and understanding that must be drawn upon in order to answer a particular question – are: money and transactions, planning and managing finances, risk and reward, and financial landscape. These areas are closely reflected in the Core competencies framework (OECD, 2015a). As PISA is an international assessment, test questions focus on financial products, services and situations that are comparable across countries, and care is taken not to frame questions in terms, for instance, of credit cards or retirement/pensions, which tend to vary considerably from one country to the other.

173. The results of the 2012 PISA financial literacy assessment provided a quantitative measure of the extent to which financial literacy varies across and within countries. The report looked at differences, within countries, between groups of students, in terms of gender, socio-economic status, and immigrant background and it analysed the correlation between students' performance in financial literacy with their performance in mathematics and reading (OECD, 2014b).

**The Education 2030 taxonomy and curriculum redesign, implementation and assessment**

174. An OECD stocktaking survey across several countries revealed that the successful integration of financial education in school curricula can be challenging in many respects, and especially because of a lack of resources and time; overloaded curricula; insufficient expertise and know how; lack of easily available high-quality materials; the variety of stakeholders involved; limited political willingness and commitment (OECD, 2014a). In spite of the challenges, a number of countries have already introduced financial education in their school curricula, mostly by integrating it into other subjects, such as mathematics, citizenship, or as a cross-curricular theme (see Box 2).

175. An analysis of existing financial literacy learning frameworks showed that most of them agree on the main dimensions of financial education, namely knowledge and understanding; skills; and attitudes and values, and on its expected outcomes, such as improved decision-making and well-being (OECD, 2014a). For instance, according to the Australian National Consumer and Financial Literacy Framework (2011) "Individuals who are consumer and financially literate have the ability to apply knowledge, understanding, skills and values in consumer and financial contexts to make informed and effective decisions that have a

---

<sup>24</sup> The first assessment was conducted in 2012 among 18 countries and economies: Australia, the Flemish Community of Belgium, Shanghai-China, Colombia, Croatia, the Czech Republic, Estonia, France, Israel, Italy, Latvia, New Zealand, Poland, the Russian Federation, the Slovak Republic, Slovenia, Spain and the United States. Results of the 2012 assessment are available in OECD (2014b).

<sup>25</sup> The 2015 assessment covers 15 countries and economies: Australia, the Flemish Community of Belgium, Brazil, the four provinces of Beijing, Shanghai, Jiangsu and Guangdong in China, seven provinces in Canada, Chile, Italy, Lithuania, the Netherlands, Peru, Poland, Russia, the Slovak Republic, Spain and the United States. Results of the assessment will become available in May 2017.

positive impact on themselves, their families, the broader community and the environment” (MCEECDYA, 2011). A similar conceptual framework underpins the PISA definition of financial literacy.<sup>26</sup>

176. The common structure between many of the existing financial literacy learning frameworks and the Education 2030 learning framework corroborates the usefulness and relevance of the Education 2030 taxonomy. While it may not be able – alone – to address all the challenges related to the introduction of financial literacy (and other concepts) in the school curriculum, it offers a useful tool for thinking about how to deconstruct complex concepts and design future curricula to incorporate new competencies.

### **Box 2. Examples on the introduction of financial literacy in the school curriculum**

A growing number of countries are introducing financial education in the curriculum to various extents, mostly following a cross-curricular approach. This means integrating financial literacy into other subjects and existing courses, rather than adding an additional course to already crowded curricula.

This cross-curricular approach can make it possible to use financial literacy to reinforce other skills, such as reading and mathematics, and provide a real-life application for other learning areas. For example, financial literacy is included in the New Zealand curriculum in primary and secondary education as a theme that schools can use for cross-curricular teaching and learning programmes. It provides a context for linking learning areas, such as social sciences, mathematics and statistics, English, business studies, health and technology, and it provides a relevant context for strengthening literacy and numeracy skills. Two strands are included in financial literacy learning outcomes: managing money and income (covering money, income, savings, spending and budgeting, and credit); and setting goals and planning ahead (covering setting financial goals, and identifying and managing risk).

Financial education was introduced in the curricula of the devolved nations in the UK at different times, but in all cases following a cross-curricular approach. Since September 2014, maintained schools in England have a mandate to include financial education lessons as part of Mathematics and Citizenship at Key Stages 3 and 4 (secondary education). Academies, free schools and independent schools have no obligation to teach it, though many use provision in the national curriculum as a benchmark for their teaching. In Scotland, financial education is embedded in the Curriculum for Excellence as part of numeracy and provides a relevant context to develop skills for learning, life and work. In Wales, financial education has been embedded within the statutory primary and secondary curriculum since 2008, principally in mathematics, but specific elements of financial education have been included in the ‘Personal and Social Education’ and ‘Careers and the World of Work’. Financial education is part of the primary and secondary curriculum in Northern Ireland, and is an element of both mathematics and personal development (Young Enterprise, 2016).

A few countries have also developed standards for financial literacy in order to precisely define the content to be taught and the skills to be developed. For example, in Australia, the 2011 National Consumer and Financial Literacy Framework describes essential consumer and financial capabilities and provides guidance on how these may be structured in compulsory education. Financial literacy topics are also integrated in the Australian Curriculum, mostly into mathematics and economics and business. To facilitate teachers in integrating financial literacy topics in their lessons, the Australian Securities and Investments Commission developed teachers’ resources that are aligned to the Australian curriculum ([www.moneySMART.gov.au/teaching](http://www.moneySMART.gov.au/teaching)).

<sup>26</sup> “Financial literacy is knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life.” (OECD, 2013)

## 7. Student Well-being - Mr Alejandro Adler and Mr Martin Seligman, University of Pennsylvania

Knowledge			Skills			Attitudes & Values
Disciplinary / learning areas	Inter-disciplinary / cross curricular	Practical	Cognitive & meta-cognitive	Social & emotional	Physical & practical	
<i>Constructs</i> <ul style="list-style-type: none"> <li>• Psychology</li> <li>• Financial literacy</li> <li>• Physiology</li> <li>• Computer sciences</li> <li>• Numeracy</li> <li>• Accounting</li> <li>• Economics</li> <li>• History</li> <li>• Literature</li> <li>• Sociology</li> <li>• Citizenship</li> </ul>	Constructs <ul style="list-style-type: none"> <li>• Integrative complexity: adopting different paradigmatic lenses using different disciplines to understand a phenomenon</li> <li>• Prospection: correctly predicting and planning for the future</li> <li>• Character strengths and virtues: knowing what they are and how to identify them in characters throughout history, in literature, and beyond</li> </ul>	Constructs <ul style="list-style-type: none"> <li>• Healthy nutrition</li> <li>• Balanced exercise routines</li> <li>• Mental replenishment</li> <li>• Emotional literacy</li> <li>• Interpersonal active constructive responses</li> <li>• Using the empirically defined taxonomy of character strengths in school and in life</li> <li>• Meaning-finding</li> <li>• Passion/calling identification</li> <li>• SMART goals: setting goals that are specific, measureable, attainable, relevant, and timely</li> <li>• Life-planning for the short-, medium-, and long-term</li> </ul>	Constructs <ul style="list-style-type: none"> <li>• Mindfulness</li> <li>• Creative thinking</li> <li>• Critical thinking</li> <li>• Problem solving</li> <li>• Decision making</li> <li>• Goal setting</li> <li>• Good Judgment</li> <li>• Self-control</li> </ul>	Constructs <ul style="list-style-type: none"> <li>• Effective communication</li> <li>• Empathy</li> <li>• Compassion</li> <li>• Leadership</li> <li>• Mindfulness</li> <li>• Resilience</li> <li>• Emotional intelligence: identifying emotions, correctly interpreting them, and effectively managing them</li> <li>• Collaboration</li> </ul>	Constructs <ul style="list-style-type: none"> <li>• Physical fitness</li> <li>• Positive technology use</li> <li>• Engaging with creative activities, such as the multiple arts.</li> </ul>	Constructs <ul style="list-style-type: none"> <li>• Compassion</li> <li>• Teamwork</li> <li>• Gratitude</li> <li>• Citizenship</li> <li>• Fairness</li> <li>• Integrity</li> <li>• Open-mindedness</li> <li>• Perseverance</li> <li>• Curiosity</li> <li>• Creativity</li> <li>• Humour</li> <li>• Good judgment</li> <li>• Love of learning</li> <li>• Honesty</li> <li>• Bravery</li> <li>• Zest</li> <li>• Kindness</li> <li>• Hope</li> <li>• Forgiveness</li> <li>• Peace</li> <li>• Dignity</li> </ul>

## **Introduction**

177. Should we teach well-being? Can well-being be taught at a large scale, and should it be taught in schools? Does teaching well-being improve academic performance and other life outcomes? What knowledge, skills, attitudes, and values increase youth well-being?

178. Embedded in the concept of education is the notion of changing individuals in a particular direction, of taking them from their current state to, ideally, a better one. That direction is informed by how we measure success in an educational setting. If schools measure only academic performance, as they traditionally have, then effective schools will, at best, produce students who learn how to excel academically and perform well on standardized exams. However, if schools choose to measure multifaceted well-being as well, and hence also teach the knowledge, skills, attitudes, and values (KSAV) for well-being, they can also enable their students to lead flourishing lives.

179. Schools do not currently teach the KSAV for more positive emotions, better relationships, more engagement, and more purpose and meaning in life. Individual well-being is widely considered to be a private matter, especially if teaching for it consumes scarce educational resources and undermines academic learning.

180. It is fair to argue that opportunities for the health, safety, educational progress, and the moral development of youth are almost universally desired (Cohen, 2006; Land, Lamb, & Mustillo, 2001; Martens & Witt, 2004). Peterson (2006) contended that schools are uniquely conducive to these opportunities; he called for schools to expand their focus beyond academic learning to also include the promotion of character and well-being.

181. Existing evidence shows that the KSAV for well-being are learnable and that well-being and academic achievement are not mutually exclusive; rather, they are mutually reinforcing (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Greenberg et al., 2003; Seligman et al., 2009). We empirically argue that teaching well-being is both feasible and desirable, both for the intrinsic value of well-being, as well as for the instrumental value of well-being: the positive impact of well-being on academic performance, on physical health, and on other favourable life outcomes.

## **Student well-being through the lens of four principles**

### ***Relevant towards 2030***

182. Drawing on the field of positive psychology, positive education offers a new educational model that, in parallel to academic learning, emphasizes positive emotions, character traits, and personalized motivation to promote learning (Seligman et al., 2009). Positive education focuses on cultivating student, teacher, and administrator well-being in parallel to teaching academic achievement skills. It recognizes that well-being has both intrinsic and instrumental value.

183. The psychological literature offers several compelling empirical arguments for adopting a positive education model. Existing evidence suggests that youth well-being contributes to academic achievement, fewer risky adolescent behaviours, and better physical health during adolescence and adulthood (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Hoyt, Chase-Lansdale, McDade, & Adam, 2012). Further, studies have shown that well-being is a protective factor against youth depression and that it promotes creativity, social cohesion, and civic citizenship (Nidich et al., 2011; Seligman et al., 2009; Wang, Haertel, & Walberg, 1997; Waters, 2011). From a more holistic perspective, psychological and physical health reliably contribute to enhanced academic performance and other positive life outcomes (Lippman, 2015).



184. Beyond the schooling years, longitudinal analyses have shown that adolescent well-being predicts life-outcomes in adulthood, including physical health, marriage strength, delinquency, gang membership, risky sex, drug abuse, and obesity (Bogg & Roberts, 2004; Hamre & Pianta, 2001; Howell, Kern, & Lyubomirsky, 2007; Hoyt, Chase-Lansdale, McDade, & Adam, 2012; Kern & Friedman, 2008; Lyubomirsky, King, & Diener, 2005; Pressman & Cohen, 2005; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003; Tsukayama et al., 2010). Beyond cross sectional and longitudinal studies on well-being and its correlates, it is important to explore which domains of well-being are changeable and how to best change them, as well as other domains of life to which they contribute.

### ***Impactful & Malleable***

185. Many are sceptical about incorporating well-being to schools' curricula due to perceived limited rigorous experimental evidence on the effects of well-being on academic achievement. During the last few decades, most research on the impact of well-being on academic achievement has focused on the detrimental effects of mental illnesses. Meta-analyses show that mental illness contributes to lower grades, higher absenteeism, lower self-control, and higher dropout rates (Hinshaw, 1992; McLeod & Fettes, 2007). However, research on youth well-being and academic achievement increasingly suggests that individual flourishing significantly contributes to enhanced educational performance.

186. Studies on subjective well-being have shown that negative emotions may contribute to restricted attention and that positive affect is associated with more creative thinking, more holistic thinking, and broader attention (Bolte, Goschke & Kuhl, 2003; Estrada, Isen, & Young, 1994; Fredrickson, 1998; Fredrickson & Branigan, 2005; Isen, Daubman, & Nowicki, 1987; Isen, Rosenzweig, & Young, 1991; Kuhl, 1983, 2000; Rowe, Hirsh, Anderson, & Smith, 2007). A recent one-year longitudinal study with American middle school students found that even though anxiety and depression predicted school absenteeism, they did not predict students' grades. In the same study, students' subjective well-being (positive affect and life satisfaction) predicted better grades, particularly in math and reading (Suldo, Thalji, & Ferron, 2011).

187. Positive school relationships seem to contribute to academic achievement. A meta-analysis of 148 studies involving 17,000 students conducted in 11 countries found that positive peer relationships explained 33-40% of the variance in academic achievement (Roseth, Johnson & Johnson, 2008). Studies show that students' social competence and the quality of their friendship networks are predictive of academic achievement (Caprara et al., 2000; Wentzel & Caldwell, 1997). Research has also suggested that the quality of teacher-student relationships influences student learning outcomes (Cornelius-White, 2007; Hattie, 2009). Other data suggest that children with positive teacher-student relationships get better grades, have more positive attitudes toward school, are more engaged in the learning that occurs in the classroom, and are less likely to repeat a grade (Birch & Ladd, 1997; Hamre & Pianta, 2001). Students who believe that their teachers care about them are more motivated to try hard, to pay attention in class, and to do well; they are more likely to perform well and stay in school rather than drop out (Benard, 2004; Pianta, 1999; Szejnberg, den Brok, & Hurek., 2004; Wentzel 1997).

188. Social Emotional Learning (SEL) is a growing educational field which teaches students KSAV that enable them to better identify their goals, manage their emotions, enhance their personal relationships, and increase school performance (Greenberg et al., 2003). Examples of these KSAV include emotional recognition, emotional management, effective communication, decision making, goal setting, empathy, and problem solving (Payton et al., 2008).

189. Using existing longitudinal data, a meta-analysis of SEL programs in 213 schools with over 200,000 students showed that the programs have had significant effects on different student outcomes. On

average, students' grades increased by 11 percent, prosocial behaviours increased by 9 percent, adolescent depression and anxiety decreased by 9 percent, and behavioural issues decreased by 9 percent (Payton et al., 2008).

190. Recently, Adler and Seligman (2016) presented the results of three large-scale randomized controlled trials (RCTs) from around the world. In Study 1, 18 secondary schools (n=8,385 students) in Bhutan were randomly assigned to a treatment group (k=11) or a control group (k=7). The treatment schools received an intervention targeting ten non-academic well-being, including mindfulness, empathy, compassion, effective communication, creative thinking, critical thinking, problem solving, leadership, resilience, and decision making. Program 2 was a replication study at a larger scale in 70 secondary schools (m = 68,762 students) in Mexico. The schools were randomly assigned to a treatment group (j = 35) or a control group (j = 35). Program 3 was the last replication study at a larger scale in 694 secondary schools (q = 694,153 students) in Peru. The schools were randomly assigned to a treatment group (h = 347) or a control group (h = 347).

191. In all three programs, students in the intervention schools reported significantly higher well-being and they performed significantly better on standardized national exams at the end of a 15-month intervention. Furthermore, the results for both well-being and academic performance remained significant 12 months after the intervention ended. In all three programs, perseverance, engagement, and quality of interpersonal relationships emerged as the strongest mechanisms underlying how increases in well-being improved academic performance. Following these positive results, all three programs have been taken to a national scale in Bhutan, Peru, and Mexico.

192. Combined with prior research, Adler and Seligman's (2016) results suggest that, independent of social, economic, or cultural context, teaching well-being in schools at a large scale is both feasible and desirable, both for the intrinsic value of well-being, as well as for the instrumental value of well-being: the positive impact of well-being on academic performance, on physical health, and on other favourable life outcomes.

### ***Measurable***

193. A missing element to existing models of well-being, primarily based on adult research, is the obvious precursor – the well-being and functioning of youth. The literature on developmental psychology has mostly focused on child and adolescent psychopathology, with limited attention on youth well-being. Adolescence is a particularly significant developmental and malleable period in life (Steinberg & Morris, 2001). The thriving of adolescents is often evaluated by academic performance and little else.

194. In adults, well-being is best characterized as a profile of indicators across multiple domains, rather than as a single factor (Forgeard, Jayawickreme, Kern, & Seligman, 2011; Keyes, 2007; Lerner, Phelps, Forman, & Bowers, 2009; Organization for Economic Cooperation and Development [OECD], 2012; Ryff & Keyes, 1995). There are both theoretical and practical reasons for approaching well-being as a multidimensional construct across valued life domains (Huppert & So, 2013). On the theoretical side, well-being is an abstract construct that includes both feeling good (hedonic well-being) and functioning well (eudemonic well-being; Huppert, 2014). Well-being is not best defined by a single measure; rather, it is comprised of various domains that can be reliably and usefully measured (Seligman, 2011).

195. Existing models offer different well-being domains. For instance, Seligman's (2011) Well-being Theory delineates five domains of life that people pursue as ends in themselves: positive emotion, engagement or flow, positive relationships, meaning or purpose, and achievement, or PERMA. Ryff (1995) suggests six components of well-being: self-acceptance, positive relationships with others, autonomy, environmental mastery, purpose in life, and personal growth. At the societal level, Gallup has created the

Healthways Well-being Index that includes life evaluation, emotional health, physical health, healthy behaviours, work environment, and access to basic needs (Kahneman & Deaton, 2010). The Organization for Economic Cooperation and Development (OECD) has created the *Your Better Life Index*, comprised of 11 topics considered essential to quality of life (housing, income, jobs, community, education, environment, governance, health, life satisfaction, safety, work-life balance). The index allows countries and individuals to identify the domains that are most important to them (OECD, 2015).

196. One of the advantages of a “dashboard” (multidimensional) approach to well-being is that individual domains may differentially contribute to outcomes of interest. For example, a review of positive psychological well-being and cardiovascular outcomes found that optimism reliably predicted lower risk of cardiovascular disease and mortality, but findings were mixed for other aspects of well-being (Boehm & Kubzansky, 2012). Similarly, Diener and Chan (2011) noted that studies are needed to “determine how the concepts are related to one another and their independent ability to predict health outcomes beyond a general [subjective well-being] factor score” (p. 27). Positive constructs are often highly correlated with one another, yet it is most productive and scientifically responsible to study them independently (Friedman & Kern, 2014). Only by simultaneously considering multiple domains and taking into account factor inter-correlations can we see which factors, and what mechanisms, drive different outcomes.

197. Adolescent well-being researchers have proposed five factors of youth well-being that are somewhat analogous to the five domains of Seligman’s (2011) Well-being Theory: engagement (absorption and focus on what one is doing and interested in life activities), perseverance (pursuing goals to completion, despite setbacks), optimism (hopefulness and confidence for the future), connectedness (satisfying relationships with others, feeling loved, and providing friendship to others), and happiness (positive affect), or EPOCH (Kern, Waters, Adler, & White, 2015). The EPOCH factors mirror PERMA’s five-factor structure, with domains for meaning and accomplishment being represented by optimism and perseverance, respectively (Kern, Waters, Adler, & White, 2014). The EPOCH measure of adolescent well-being has been internationally validated in various cross-cultural populations (Kern, Benson, Steinberg, & Steinberg, 2015).

198. Corresponding to unidimensional and multidimensional models of well-being, validated corresponding measures of well-being exist. Below, we present a constellation of the most widely used survey instruments for youth well-being.

199. The Positive and Negative Affect Schedule for Children (PANAS-C; Laurent et al., 1999) assesses 15 positive and 15 negative emotions felt over the past month. Positive emotions include joy, excitement, and interest; negative emotions include sadness, stress, and fear. The Satisfaction with Life Scale (adapted for children) measures individuals’ assessment of their lives as a whole ( $\alpha = .86$ ; Gadermann, Schonert-Reichl, & Zumbo, 2010). The Children’s Hope Scale (Snyder et al., 1997) assesses agency and pathways of hope (e.g., “I think the things I have done in the past will help me in the future”, 6 items,  $\alpha = .84$ ). The Gratitude Questionnaire (McCullough, Emmons, & Tsang, 2002) assesses stable tendencies to experience gratitude in daily life (e.g., “I have so much in life to be thankful for”, 6 items,  $\alpha = .71$ ). The Growth Mind-set scale (Dweck, 2006) assesses the extent to which individuals believe their mind-sets are fixed versus open to growth and experience (e.g., “No matter how much intelligence you have, you can always change it quite a bit”, 6 items,  $\alpha = .85$ ).

200. The Healthy Pathways Child Report Scales (Bevans, Riley, & Forrest, 2010) are unidimensional scales that assess aspects of health, illness, and well-being in clinical and population-based research studies involving youth in transition from childhood to adolescence. The instrument measures physical vitality (e.g., “how often do you feel really healthy?” 4 items,  $\alpha = .81$ ), somatic symptoms (e.g., “how often do you have a headache?” 4 items,  $\alpha = .72$ ), physical activity (e.g., “How often do you play physically active

games or sports?" 4 items,  $\alpha = .84$ ), and school engagement (e.g., "How often were you interested in the work at school?" 4 items,  $\alpha = .83$ ).

201. Unidimensional survey instruments of domains such as life satisfaction are strongly affected by an individual's mood at the time, and they ignore other aspects of well-being. In fact, multidimensional measures of well-being are only moderately correlated with life satisfaction (Huppert & So, 2013). Further, reducing measures to a unidimensional notion obscures potentially valuable multi-faceted information. There are few validated multidimensional well-being scales for youth. This is one of the most important gaps in the youth well-being literature, compared to the study of adult well-being. One of them is the EPOCH Measure of Adolescent Well-being, a 20-item multidimensional measure of flourishing for youth, which assesses engagement, perseverance, optimism, connection to others, and happiness (Kern et al., 2015). Just as multiple components are necessary to define and understand adult well-being, Kern and colleagues (2015) suggest that a multifaceted approach to adolescent well-being is necessary. In the three studies that we present, we mainly used the EPOCH instrument to measure adolescent well-being, since it reflects the best of experimental well-being science, both in its multidimensionality and in its content.

202. An advantage of multidimensional well-being metrics is that they can identify individuals' specific strengths and weaknesses. In education, overall grade point average indicates a student's overall performance, but it obscures individual academic areas in which students thrive and struggle. Report cards break down grades across subject areas, signalling weak areas. Similarly, assessments of well-being need to go beyond global unitary assessments to provide teachers and school counsellors with specific information about domains in which students do well, average, or poorly. For example, two individuals can score similarly on overall well-being, but one scores high on engagement, moderately on competence, and low on self-esteem, whereas the other scores moderately on engagement, low on competence, and high on self-esteem. With this dashboard of information, the two individuals will probably make different decisions based on their strengths and deficiencies.

### **The Education 2030 taxonomy and curriculum redesign, implementation and assessment**

203. Studies have shown that without whole-school cultural and pedagogical shifts, well-being interventions are often ineffective and at times interfere with learning (Spence & Shortt, 2007). Well-being interventions in schools are most effective when they are not limited to one classroom, but rather when they permeate all facets of an educational institution: students, teachers, staff, leadership, existing academic subjects, and extra-curricular activities. Institutional shifts provide the most enabling conditions for well-being interventions and for the downstream effects of well-being, which might include increased academic performance.

204. A starting point for building a supportive, respectful, and connected school culture is to help a school community clarify and reach agreement about the values that guide a school's practices. If a school articulates well-being through its vision statement, policies, structures, and teaching practices, then these values form a compass that guides how individual in the school community interact and communicate, and it informs the choices they make. The results from a longitudinal study that tracked high school students over fifty years into late adulthood suggests that learning to act in accord with prosocial values may contribute to sustained well-being. The students in the study were interviewed every ten years, and the results showed that adolescents who lived in accordance with prosocial values became both psychologically and physically healthier adults (Wink & Dillon, 2003).

205. As a public policy case study, the Australian Government has recognized the critical importance of a whole-school approach to well-being in its Values Education Project, which involved 166 schools and 70,000 students. Longitudinal data on the project showed that even though involving whole-schools was resource intensive, there were deeper commitments to the program, better results, and longer continuity

using a whole-school approach, compared to similar prior programs that did not use a whole-school approach (Lovat & Toomey, 2009).

206. There is increasing evidence on the effectiveness of interventions exclusively targeting well-being; among them is the Penn Resiliency Program (PRP). Its curriculum seeks to teach students several KSAV, including optimism, creativity, relaxation, decision making, assertiveness, problem solving, and coping skills. During the past two decades, close to 20 studies involving more than 2,000 children have evaluated the impact of the PRP compared to control groups (Seligman, et al., 2009). The data have found the PRP to reduce symptoms of depression, reduce behavioural problems, work equally well for children of different races and ethnicities, and be most effective with adequate training and supervision (Brunwasser & Gillham, 2008; Gillham, Brunwasser, & Freres, 2007; Seligman, et al., 2009).

207. The most successful programs around the world that have incorporated well-being KSAV into their school curricula are those in which principals and teachers learn how to practice and how to teach well-being KSAV. Teachers are also trained to infuse their academic subjects (e.g., math, science, and reading) with KSAV. Including KSAV that promote well-being in schools' curricula have increased academic performance on standardized exams in intervention schools by more than half a standard deviation, compared to control schools, which is roughly equivalent to a full academic year and is greater than any program directly targeting academic performance (Adler & Seligman, 2016).

208. In Bhutan, for instance, literature was taught through a “GNH lens” by identifying strengths and virtues in characters from novels and by encouraging students to use these strengths in their daily lives. Further, all students in “GNH Schools” participated in botany practices in organic gardens in every single school campus. They learned to plant, grow, and harvest vegetables and other foods. By studying the plants' physiology, genetics, ecology, classification, structure, and economic importance, students learned how to interactively apply what they were learning in their biology, chemistry, physics, and mathematics classes to their botanic practices. Furthermore, through the complex process of growing different plants with their fellow students and understanding the role of food in the larger local and national economic system, students learned to practice critical thinking, creative thinking, decision making, collaboration, effective communication, and problem solving KSAV, to name a few. Within the classroom, teachers learned how to give students verbal and written feedback in a way that empowered and inspired them to enhance the quality of their work. Teachers learned the importance of identifying and noting what students were doing right in their classwork, instead of only highlighting what they were doing wrong, which is typical of pedagogical practices in most educational systems (Ibid, 2016).

209. These are a few of many existing examples of how student well-being can be infused into all domains of the educational experience, within the formal academic curriculum, in extra-curricular activities, in students' social work, and beyond. Studies consistently show that academics and well-being are not only not mutually exclusive, but rather, that they are mutually reinforcing. Positive education provides empirically-based arguments that well-being can reliably be taught and that well-being should be taught, both for its intrinsic value and for its instrumental value.

## ANNEX I - REFERENCES

### **Global Citizenship - Ms Connie Chung, Harvard Graduate School of Education**

- Andreotti, V. (2006). "Soft versus critical global citizenship education," *Policy & Practice: A Development Education Review*, Vol. 3: 40-51.
- Asia Society (2016). <http://asiasociety.org/mapping-nation/infographics>
- Boix Mansilla, V. & Jackson, A. (2010). *Educating for Global Competence: Preparing Our Youth to Engage the World*. Asia Society: Washington, D.C..
- Burciul, B. (2013). Mastercard Foundation Scholars Program, Evaluating Global Citizenship. Presentation at the Global Citizenship Education Forum, Bangkok, Thailand, December 2013.
- Council of Europe (2016). *Competences for democratic culture: living together as equals in culturally diverse democratic societies*. Council of Europe Publishing.
- Deardorff, D. (2013). "Promoting understanding and development of intercultural dialogue and peace: a comparative analysis and global perspective of regional studies on intercultural competence". Report prepared for UNESCO Division of Cultural Policies and Intercultural Dialogue.
- Eidoo, S. Ingram, L., MacDonald, A., Nabavi, M., Pashby, K., & Stille, K. (2011). "Through the Kaleidoscope": Intersections between Theoretical perspectives and Classroom Implications in Critical Global Citizenship Education. "*Canadian Journal of Education*. 34(4).
- Haste, H. (2001). Ambiguity, autonomy, and agency: psychological challenges to new Competence. In Rychen and Salganik (eds), 2001, 93-120.
- Horvathova, M. (2015). Review study OECD Dutch curriculum: '#Onderwijs 2032' - Paper #2: Globalization and social cohesion. Report prepared for OECD.
- Leung, K., Ang, S., & Tan, M. L. (2014). Intercultural Competence. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 1, 489-519.
- Menton, A. (2015). What is Global Citizenship Education? Asia Society. <http://asiasociety.org/blog/asia/what-global-citizenship-education>
- NASA (2016). <http://climate.nasa.gov/evidence/>
- NEA (2010). NEA Policy Brief: Global Competence is a 21<sup>st</sup> Century Imperative. NEA Education Policy and Practice Department. Washington, D.C.
- Nukkula, M. & Toshalis, E. (2006). *Understanding youth : adolescent development for educators*. Harvard Education Press: Cambridge, MA.

OECD (2016). *Global Competency for an Inclusive World*. OECD: Paris.

Pashby, K. (2008). “Demands on and of citizenship and schooling: ‘Belonging’ and ‘diversity’ in the global imperative” In Michael O’Sullivan and Karen Pashby (Eds) *Citizenship education in the era of globalization: Canadian perspectives*. Sense Publishing: Rotterdam.

Reimers, F. M. (2013). *Assessing global education: An opportunity for the OECD*. Report prepared for OECD.

Reimers, F. M. & Chung, C. K. (2016). *Teaching and Learning for the Twenty-First Century: Educational Goals, Policies, and Curricula from Six Nations*. Harvard Education Press: Cambridge, MA.

Reimers, F. M., Chopra, V., Chung, C. K., Higdon, J. O’Donnell, E.B. (2016). *Empowering global citizens: a world course*. CreateSpace Independent Publishing Platform.

Sinclair, M. (2004). *Learning to live together: building skills, values, and attitudes for the twenty-first century*. UNESCO: Paris.

Steinburg, L. (2014). *Age of Opportunity: Lessons from the New Science of Adolescence*. Eamon Dolan/Mariner Books.

Suárez Orozco, M. (2008). *Learning in a global era: International perspectives on globalization and education*. Berkeley: University of California Press;

Sussmuth, Rita (2007). “On the need for teaching intercultural skills: Challenges for education in a globalizing world.” Pp. 195-212. *Learning in the global era* (Ed. M.M. Suarez-Orozco). Pp.158-174. Berkeley: University of California Press.

United Nation’s Global Education First Initiative (2012). <http://iif.un.org/content/un-secretary-general-launches-major-new-education-initiative>

UNESCO (2014). *Global Citizenship Education: Preparing Learners for the Challenges of the Twenty-First Century*. UNESCO.

UNESCO Infographic (2016).  
[http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/pdf/GCEinfographics\\_full.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/pdf/GCEinfographics_full.pdf)

UNESCO (2016). *Global Education Monitoring Report, Education for people and planet: creating sustainable futures for all*. UNESCO.

### **Global Citizenship - Competences for Democratic Culture: Mr Calin Rus, expert, Council of Europe**

Aboud, F.E. & Levy, S.R. (2000). Interventions to reduce prejudice and discrimination in children and adolescents. In S. Oskamp (Ed.), *Reducing prejudice and discrimination* (pp. 269-293). Mahwah, NJ: Lawrence Erlbaum Associates Publishers; Paluck, E.L. & Green, D.P. (2009). Prejudice reduction: What works? A review and assessment of research and practice. *Annual Review of Psychology*, 60, 339-367; Pfeifer, J.H., Spears Brown, C. & Juvonen, J. (2007). Prejudice reduction in schools. *Social Policy Report*, Volume XXI, Number II.

Barrett, M. & Zani, B. (Eds.) (2015). *Political and Civic Engagement: Multidisciplinary Perspectives*. London: Routledge. Torney-Purta, J., Lehmann, R., Oswald, H. & Schulz, W. (2001). *Citizenship and Education in Twenty-Eight Countries: Civic Knowledge and Engagement at Age Fourteen*. Amsterdam: IEA; Schulz, W., Ainley, J., Fraillon, J., Kerr, D. & Losito, B. (2010). *ICCS 2009 International Report: Civic Knowledge, Attitudes, and Engagement among Lower Secondary School Students in 38 Countries*. Amsterdam: IEA.

Boix Mansilla, V., Schwartz, B., Jackson, A. (2013) *Educating for Global Competence: Learning Redefined for an Interconnected World*. In Heidi Jacobs, *Mastering Global Literacy, Contemporary Perspectives*. New York: Solution Tree.

Department for Communities and Local Government (2010). *Preventing Support for Violent Extremism through Community Interventions: A Review of the Evidence*. London: Department for Communities and Local Government.

Zani, B. & Barrett, M. (Eds.) (2012). *Engaged Citizens? Political Participation and Social Engagement among Young People, Women, Minorities and Migrants*. Special issue of *Human Affairs*, 22(3), July 2012.

### **Foresight - Mr Peter Bishop, Teach the Future**

Bateman, D. (2012). Transforming teachers' temporalities: Futures in an Australian classroom. *Futures*, 44(1), 14–23. doi:10.1016/j.futures.2011.08.003

Bishop, P. C., & Hines, A. (2012). *Teaching about the Future: The Basics of Foresight Education*. London: Palgrave Macmillan.

Bishop, P. C. (2016, March). The University Foresight Network: The Search for Common Ground among Foresight Educators. *World Future Review*, vol. 8, 1: pp. 6-11.

Bury, J. B., & J. B. (John Bagnell) Bury (2004). *The idea of progress*. United States: Kessinger Publishing Co.

Eckersley, R. (1997). Portraits Of Youth: Understanding young people's relationship with the future. *Futures*, 29(3), 243–249.

“Final” Version Of Foresight Competency Model. (2016, August 03). Retrieved September 16, 2016, from Association of Professional Futurists, apf.org

Gidley, J. M. (2001). An intervention targeting hopelessness in adolescents by promoting positive future images. *Australian Journal of Guidance and Counselling*, 11, 51–64. doi:10.1017/s1037291100004337

Gidley, J., Smith, C., & Bateman, D. (2004). *Futures in education: Principles, practice and potential*. Hawthorn, Vic.: Australian Foresight Institute, Swinburne University.

Grim, T. (2009). Foresight Maturity Model (FMM): Achieving Best Practices in the Foresight Field. *Journal of Futures Studies*, 13(4), 69–80.

Hicks, D. (1996). Retrieving the dream. *Futures*, 28(8), 741–749. doi:10.1016/0016-3287(96)00032-8

Hicks, D., & Holden, C. (2007). Remembering the future: What do children think? *Environmental Education Research*, 13(4), 501–512. doi:10.1080/13504620701581596

Hines, A., & Bishop, P. C. (2013), Framework foresight: Exploring futures the Houston way. *Futures*, 51, 31-49.

Mercier, S. (1771). *L'Ann 2440: rêve s'il en fut jamais*. Amsterdam: Van Harrevelt.



Schleicher, A. (2016, February 02). Education 2030. Lecture presented at 18th OECD/Japan Seminar in Japan, Tokyo.

Senge, P. M. (1990). *The Fifth Discipline*. New York: Doubleday/Currency.

### **Innovation - Mr Guillermo José Aguirre-Esponda, Grupo Aguirre – Innovalia**

ACMI (2008) Advisory Committee on Measuring Innovation - Innovation Measurement: Tracking the State of Innovation in the American Economy, A Report to the Secretary of Commerce by the Advisory Committee on Measuring Innovation in the 21st Century Economy

Alegre J, Chiva R (2014) - Assessing the impact of organizational learning capability on product innovation performance: An empirical test *Technovation*, Volume 28, Issue 6, pp 315-326

Alegre J, Chiva R (2012) - The impact of technological innovation on international trade patterns: The evidence reconsidered *Research Policy*, Volume 16, Issue 2, pp 101-130

Andrews C, (2015) - Delivering education to the poor: investigating the role of self-motivation in Brazil *International Review of Administrative Sciences* September 24, 2015

Armbruster H, Bikfalvi A, Kinkel S, Lay G (2014) - Organizational innovation: The challenge of measuring non-technical innovation in large-scale surveys *Technovation*, Volume 28, Issue 10, pp 644-657

Batty M, Collins J M and Odders-White E (2015) - “Experimental Evidence on the Effects of Financial Education on Elementary School Students' Knowledge, Behavior, and Attitudes”, *Journal of Consumer Affairs*, 49: 69-96. doi:10.1111/joca.12058

Bloch C (2005) - Innovation measurement: Present and future challenges, Eurostat Conference

Bloom D, Canning D, and Chan K (2012) - A causality analysis of the link between higher education and economic development, *Economics of Education Review*, Volume 14, Issue 4, pp 351-361 Jean-Luc de Meulemeester, Denis Rochat

Borins S (2001) - Public Management Innovation in Economically Advanced and Developing Countries *International Review of Administrative Sciences*, December 2001; vol. 67, 4: pp. 715-731

Carayannis E, Provance M (2008) - Measuring firm innovativeness: towards a composite innovation index built on firm innovative posture, propensity and performance attributes , *Journal of Innovation* , [inderscienceonline.com](http://inderscienceonline.com)

Coombs R, Miles I (2013) - Innovation, Measurement and Services: The New Problematique, in *Innovation Systems in the Service Economy - Volume 18 of the series Economics of Science, Technology and Innovation* pp 85-103,

Frenz M, Ietto-Gillies G (2009) - The impact on innovation performance of different sources of knowledge: Evidence from the UK Community Innovation Survey *Research Policy*, Volume 38, Issue 7 (2009), pp 1125-1135

- Galvin M (2012) - Teaching Design Thinking: Expanding Horizons in Design Education. Gavin Melles, Zaana Howard, Scott Thompson-Whiteside Swinburne University, Faculty of Design, Australia January 2012
- Harvard U (2006) - Higher Education and Economic Development in Africa Human Development Sector, Africa Region, Harvard University, February 2006
- Han J, Kim N, Srivastava R (1998) - Market Orientation and Organizational Performance: Is Innovation a Missing Link? *Journal of Marketing* Vol. 62, No. 4 (Oct., 1998), pp. 30-45
- Hanushek, E, Woessmann L, Jamison E, Dean J (2008) - Education and Economic Growth Education Next, Spring 2008
- Hodgkinson G (2013). Teaching Design Thinking. In J. Herrington, A. Couros & V. Irvine (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology 2013* (pp. 1520-1524). Association for the Advancement of Computing in Education (AACE).
- Hua Z, Yang J, Coulibaly S, Zhang B (2006). Integration TRIZ with problem solving tools: a literature review from 1995 to 2006. *International Journal of business innovation and research*. Volume 1, pp 111-128.
- Kitsune B, Armstrong R (2012) – A Junior Officer and a Discovery – USNI on William Sims, <http://blog.usni.org/2012>.
- McAdam R, Keogh W (2004) - Transitioning towards creativity and innovation measurement in SMEs, - *Creativity and Innovation Management*, 2004 - Wiley Online Library
- Ritter T, Gemünden H (2014) - The impact of a company's business strategy on its technological competence, network competence and innovation success, *Journal of Business Research*, Volume 57, Issue 5, pp 548-556,
- Rogers M (1998) - The definition and measurement of innovation, [academia.edu](http://academia.edu)
- Smith K H (2005) - Measuring Innovation. In: *The Oxford Handbook of Innovation*. Oxford University Press, New York, US, pp. 148-177. ISBN 0 19 926455 4
- Thorvaldur G (2001) - Natural resources, education, and economic development *European Economic Review*, Volume 45, May 2001, Issue 4, pp 847-859

**Computational thinking/Programming/Coding - Ms Anja Balanskat, European Schoolnet**

- Balanskat, A., & Engelhardt, K. (2015). *Computing our future. Computer programming and coding*. Bruxelles: European Schoolnet. Retrieved from <http://www.eun.org/publications/detail?publicationID=661>
- Berry, M. (2013). *Computing in the national curriculum. A guide for primary teachers*. UK.
- Berry, M. (2015). *Quick Start Computing, A CPD toolkit for primary teachers*. UK.

- Csizmadia, A., Curzon, P., Dorling, M., Humphreys, S., Ng, T., Selby, C., & Woollard, J. (2015). *Computational thinking A guide for teachers*. Computing at School.
- Bocconi, S., Chiocciariello, A., Dettori, G., Ferrari, A. & Engelhardt, K. (2016). *An Analysis of educational approaches to developing Computational Thinking (CompuThink) Draft only- Forthcoming in November 2016*. Institute for prospective technological studies (IPTS). Seville.
- Calao, L. A., Moreno-León, J., Correa, H. E., & Robles, G. (2015). *Developing Mathematical Thinking with Scratch*. In G. Conole, T. Klobučar, C. Rensing, J. Konert, & É. Lavoué (Eds.), *Design for Teaching and Learning in a Networked World* (Vol. 9307, pp. 17–27). Cham: Springer
- Csernoch, Mária; Biró, Piroska; Máth, János; Abari, Kálmán(2015). *Testing Algorithmic Skills in Traditional and Non-Traditional Programming Environments*. Informatics in Education, v14 n2 p175- 197 2015.
- Department for Education (2013). *National curriculum in England: computing programmes of study*.
- Duncan, C., Bell, T., & Tanimoto, S. (2014). Should your 8-year-old learn coding? In Proceedings of the 9<sup>th</sup> Workshop in Primary and Secondary Computing Education (pp. 60–69). Berlin, Germany: ACM.
- European Commission. (2016, June). COM(2016) 381/2. *A New Skills Agenda For Europe*. Working together to strengthen human capital, employability and competitiveness {SWD(2016) 195}. European Commission.
- Goldenson, D. (YEAR). *Why Teach Computer Programming? Some evidence about Generalisation and Transfer*. Software Engineering Institute Carnegie Mellon University.
- Grover, S., & Pea, R. (2013). *Computational Thinking in K–12 A Review of the State of the Field*. Educational Researcher, 42(1), 38–43. <http://doi.org/10.3102/0013189X12463051>
- Grover, S. (2014). *Foundations for Advancing Computational Thinking: Balanced Designs for Deeper Learning in an Online Computer Science Course for Middle School Students* (Doctoral dissertation, Stanford University). Retrieved from <http://stanford.edu/~shuchig/publications.html>
- KALELIOĞLU, F., GÜLBAHAR, Y., (2014). *The effects of Teaching Programming via Scratch on Problem Solving Skills: A discussion from Learners Perspective*. Informatics in Education, 2014, 13 (1), 33-50. Vilnius University.
- Moreno-León, J., Robles, G., & Román-González. (2015). Dr. Scratch: Automatic Analysis of Scratch Projects to Assess and Foster Computational Thinking. *RED. Revista de Educación a Distancia*, 15(46). Retrieved from [http://www.um.es/ead/red/46/moreno\\_robles.pdf](http://www.um.es/ead/red/46/moreno_robles.pdf)

Pea, Roy D., & Kurland, M. (1984). *On the Cognitive Effects of Learning Computer Programming*. New Ideas Psychol. Vol.2 No.2pp.137-168. Pergamon Press.

UNESCO (2011). Media and Information Literacy Curriculum for Teachers. Unesco. France.  
<http://unesdoc.unesco.org/images/0019/001929/192971e.pdf>

UNESCO (2013). Global Media and Information Literacy Assessment Framework: Country Readiness and Competencies. Unesco. France.  
<http://www.unesco.org/new/en/communicationandinformation/resources/publicationsandcommunicationsmaterials/publications/fulllist/globalmediaandinformationliteracyassessmentframework/>

Vuorikari, R., Punie, Y. Carretero, Gomez, S. (2016). *DigComp 2.0: The Digital Competence Framework for Citizens. Update Phase 1: the Conceptual Reference Model*. European Commission, 2016.

### **Financial Literacy - Ms Chiara Monticone, OECD Directorate for Financial and Enterprise Affairs**

Batty, M., Collins, J. M. and Odders-White, E. (2015), “Experimental Evidence on the Effects of Financial Education on Elementary School Students' Knowledge, Behavior, and Attitudes”, *Journal of Consumer Affairs*, 49: 69–96. doi:10.1111/joca.12058

Becchetti, L. and F. Pisani, 2011. “Financial education on secondary school students: The randomized experiment revisited.” University of Rome Tor Vergata, Working paper 34, December 2011.

Bruhn, M., L. de Souza Leão, A. Legovini, R. Marchetti and B. Zia (2016), “The Impact of High School Financial Education: Evidence from a Large-Scale Evaluation in Brazil”, *American Economic Journal: Applied Economics*, Vol. 8, No. 4, pp. 256-295.

Carlin, B.I. and D.T. Robinson (2010), “What does financial literacy training teach us?”, National Bureau of Economic Research Working Paper 16271, <http://www.nber.org/papers/w16271>

Choi J, Laibson D, Madrian BC. (2011), “\$100 bills on the sidewalk: suboptimal investment in 401(k) plans”, *The Review of Economics and Statistics*, Vol. 93(3), pp. 748-763.

Gerardi, K., L. Goette and S. Meier (2010), “Financial literacy and subprime mortgage delinquency: evidence from a survey matched to administrative data”, Working Paper Series, No. 2010-10, Federal Reserve Bank of Atlanta, Atlanta, <http://dx.doi.org/10.2139/ssrn.1600905>.

Graham J., Harvey C., Huang H. (2009), “Investor competence, trading frequency, and home bias”, *Management Science*, 55:1094–106

G20/OECD-INFE (2016), *Ensuring financial education and consumer protection for all in the digital age – Highlights*. <https://www.oecd.org/finance/financial-education/HIGHLIGHTS-G20-OECD-INFE-Report-Financial-education-and-consumer-protection-in-the-digital-age.pdf>

Hastings, J. and L. Tejada-Ashton (2008), “Financial literacy, information, and demand elasticity: Survey and experimental evidence from Mexico”, *NBER Working Paper*, No. 14538, Cambridge, MA

Lührmann M., M. Serra-Garcia and J. Winter, (2012), “The effects of financial literacy training: Evidence from a field experiment with German high-school children”, University of Munich Discussion Paper No. 2012-24, <http://epub.ub.unimuenchen.de/14101/>

- Lusardi, A. and O.S. Mitchell (2011), “Financial literacy and planning: Implications for retirement wellbeing”, in A. Lusardi and O.S. Mitchell (eds.), *Financial Literacy: Implications for Retirement Security and the Financial Marketplace*, Oxford University Press, Oxford.
- Lusardi, A. and P. Tufano (2009a), “Debt literacy, financial experiences, and overindebtedness”, *NBER Working Paper*, No. 14808, Cambridge, MA.
- Lusardi, A. and P. Tufano (2009b), “Teach workers about the perils of debt”, *Harvard Business Review*, November, pp. 22-24.
- MCEECDYA (Ministerial Council for Education, Early Childhood Development and Youth Affairs) (2011), *National Consumer and Financial Literacy Framework*, [http://www.curriculum.edu.au/verve/resources/National\\_Consumer\\_Financial\\_Literacy\\_Framework\\_k\\_FINAL.pdf](http://www.curriculum.edu.au/verve/resources/National_Consumer_Financial_Literacy_Framework_k_FINAL.pdf)
- Miller, M. et al. (2014), “Can you help someone become financially capable? A meta-analysis of the literature”, *Policy Research Working Paper*, No. WPS 6745, World Bank Group, Washington, DC.
- OECD (2005), *Recommendation on Principles and Good Practices for Financial Education and Awareness*. <http://www.oecd.org/finance/financial-education/35108560.pdf>
- OECD (2013), “Financial Literacy Framework”, in *PISA 2012 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving and Financial Literacy*, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/9789264190511-7-en>
- OECD (2014a), *Financial Education for Youth: The Role of Schools*, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/9789264174825-en>
- OECD (2014b), *PISA 2012 Results: Students and Money: Financial Literacy Skills for the 21st Century (Volume VI)*, PISA, OECD Publishing. <http://dx.doi.org/10.1787/9789264208094-en>
- OECD (2015a), *OECD/INFE Core competencies framework on financial literacy for youth*. <http://www.oecd.org/daf/fin/financial-education/Core-Competencies-Framework-Youth.pdf>
- OECD (2015b), *Addressing the Tax Challenges of the Digital Economy, Action 1 - 2015 Final Report*, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, Paris. <http://dx.doi.org/10.1787/9789264241046-en>
- OECD (2016a), “PISA 2015 Financial Literacy Framework”, in *PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic and Financial Literacy*, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/9789264255425-6-en>
- OECD (2016b), *G20/OECD INFE Core competencies framework on financial literacy for adults*. <http://www.oecd.org/daf/fin/financial-education/Core-Competencies-Framework-Adults.pdf>
- OECD/INFE (2015), *2015 OECD/INFE Toolkit for Measuring Financial Literacy and Financial Inclusion*, [http://www.oecd.org/daf/fin/financial-education/2015\\_OECD\\_INFE\\_Toolkit\\_Measuring\\_Financial\\_Literacy.pdf](http://www.oecd.org/daf/fin/financial-education/2015_OECD_INFE_Toolkit_Measuring_Financial_Literacy.pdf)
- OECD/INFE (2016 forthcoming), *Measuring Financial Literacy*.

- Romagnoli A. and Trifilidis M. (2013), “Does financial education at school work? Evidence from Italy”, Occasional Papers (Questioni di Economia e Finanza), No 155, Bank of Italy Publishing
- Stango V. and J. Zinman (2009), “Exponential growth bias and household finance”, *Journal of Finance*, Vol. 64/6, pp. 2807-2849.
- van Rooij M., A. Lusardi and R. Alessie (2012), “Financial literacy, retirement planning, and wealth accumulation”, *Economics Journal*, 122:449–78
- van Rooij, M.A., A. Lusardi and R. Alessie (2011), “Financial Literacy and stock market participation”, *Journal of Financial Economics*, Vol. 101/2, pp. 449-472.
- Walstad, W. B., K.Rebeck and R.A. MacDonald (2010), “The Effects of Financial Education on the Financial Knowledge of High School Students”, *Journal of Consumer Affairs*, 44: 336–357. doi:10.1111/j.1745-6606.2010.01172.x
- Wehinger, G. (2013), “Banking in a challenging environment: Business models, ethics and approaches towards risks”, *OECD Journal: Financial Market Trends*, Volume 2012/2. [http://www.oecd.org/finance/financial-markets/Banking\\_in\\_a\\_challenging\\_environment.pdf](http://www.oecd.org/finance/financial-markets/Banking_in_a_challenging_environment.pdf)
- Xu, L. and B. Zia (2012), “Financial literacy around the world: An overview of the evidence with practical suggestions for the way forward”, *World Bank Policy Research Working Paper*, No. 6107, Washington, DC.
- Yoong, J. (2011), “Financial illiteracy and stock market participation: Evidence from the RAND American Life Panel”, in A. Lusardi and O.S. Mitchell (eds.), *Financial Literacy: Implications for Retirement Security and the Financial Marketplace*, Oxford University Press, Oxford.
- Young Enterprise (2016), *All Party Parliamentary Group on Financial Education for Young People report. Financial Education in Schools: Two Years On – Job Done?* <https://www.pfeg.org/sites/default/files/APPG%20on%20Financial%20Education%20for%20Young%20People%20-Final%20Report%20-%20May%202016.pdf>

### **Student Well-being - Mr Alejandro Adler and Mr Martin Seligman, University of Pennsylvania**

- Adler, A., & Seligman, M. E. (2016). Using wellbeing for public policy: Theory, measurement, and recommendations. *International Journal of Wellbeing*, 6(1).
- Bevans, K. B., Riley, A. W., & Forrest, C. B. (2010). Development of the healthy pathways child report scales. *Quality of Life Research*, 19, 1195-1214.
- Bogg T, Roberts BW. (2004). Conscientiousness and health-related behaviors: A meta-analysis of the leading behavioral contributors to mortality. *Psychology Bulletin*. 130: 887- 919.
- Boehm, J. K., & Kubzansky, L. D. (2012). The heart’s content: The association between positive psychological well-being and cardiovascular health. *Psychological Bulletin*, 138, 655-691.
- Bolte, A., Goschke, T. & Kuhl, J. (2003) Emotion and intuition: effects of positive and negative mood on implicit judgments of semantic coherence, *Psychological Science*, 14, 416–421.
- Brunwasser, S.M. & Gillham, J.E. (2008) A meta-analytic review of the Penn Resiliency Programme. Paper presented at the *Society for Prevention Research*, San Francisco, May.

- Caprara, G. V., Barbaranelli, C., Pastorelli, C., Bandura, A., & Zimbardo, P. G. (2000). Prosocial foundations of children's academic achievement. *Psychological Science*, 11, 302-306.
- Cohen, J. (2006) Social, emotional, ethical, and academic education: Creating a climate for learning, participation in democracy, and well-being. *Harvard Educational Review*, 76, 201- 237.
- Diener, E., & Chan, M. Y. (2011). Happy people live longer: Subjective well-being contributes to health and longevity. *Applied Psychology: Health and Well-being*, 3, 1- 43.
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta- analysis of school-based universal interventions. *Child Development*, 82, 405-432.
- Dweck, C. (2006). *Mindset: The new psychology of success*. New York: Random House.
- Easterlin, R. A. (2013). Happiness, Growth, and Public Policy†. *Economic Inquiry*, 51(1), 1-15.
- Estrada, C.A., Isen, A.M. & Young, M.J. (1994) Positive affect improves creative problem solving and influences reported source of practice satisfaction in physicians, *Motivation and Emotion*.
- Forgeard, M. J. C., Jayawickreme, E., Kern, M. L., & Seligman, M. E. P. (2011). Doing the right thing: Measuring wellbeing for public policy. *International Journal of Wellbeing*, 1, 79- 106.
- Fredrickson, B.L. & Branigan, C. (2005) Positive emotions broaden the scope of attention and thought-action repertoires, *Cognition & Emotion*, 19, 313–332.
- Fredrickson, B.L. (1998) What good are positive emotions? *Review of General Psychiatry*, 2, 300–319.
- Friedman, H. S., & Kern, M. L. (2014). Personality, well-being, and health. *Annual Review of Psychology*, 65, 719-742.
- Gadermann, A. M., Schonert-Reichl, K. A., & Zumbo, B. D. (2010). Investigating validity evidence of the satisfaction with life scale adapted for children. *Social Indicators Research*, 96(2), 229-247.
- Gillham, J.E., Brunwasser, S.M. & Freres, D.R. (2007) Preventing depression early in adolescence: the Penn Resiliency Program, in: J.R.Z. Abela & B.L. Hankin (Eds) *Handbook of depression in children and adolescents* (New York, Guilford Press), 309–332.
- Hamre, B.K., Pianta, R.C. (2001) Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*. 2001; 72: 625- 638.
- Hinshaw, S. P. (1992). Externalizing behavior problems and academic underachievement in childhood and adolescence: causal relationships and underlying mechanisms. *Psychological Bulletin*, 111, 127- 155.
- Howell R., Kern M.L., Lyubomirsky S. (2007) Health benefits: Meta-analytically determining the impact of well-being on objective health outcomes. *Health Psychology Review*. 2007; 1: 83-136.
- Hoyt LT, Chase-Lansdale PL, McDade TW, Adam EK. (2012) Positive youth, healthy adults: Does positive well-being in adolescence predict better perceived health and fewer risky health behaviors in young adulthood? *Journal of Adolescent Health*, 50: 66-73.



- Huppert, F. A., & So, T. T. C. (2013). Flourishing across Europe: Application of a new conceptual framework for defining well-being. *Social Indicators Research, 110*, 837- 861.
- Huppert, F. A. (2014). The state of wellbeing science: Concepts, measures, interventions, and policies. In F. A. Huppert & C. L. Cooper (Eds.), *Interventions and policies to enhance wellbeing: A complete reference guide* (vol. VI).
- Isen, A. M., Daubman, K. A., Nowicki, G. P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Positive Psychology, 52*, 1122-1131.
- Isen, A.M., Rosenzweig, A.S. & Young, M.J. (1991) The influence of positive affect on clinical problem solving, *Medical Decision Making, 11*, 221–227.
- Kahneman, Daniel, and Angus Deaton. 2010. “High income improves evaluation of life but not emotional well-being.” *Proceedings of the National Academy of Sciences*, 107 (38) 16489- 16493.
- Kern, M. L., Waters, L., Adler, A., & White, M. (2014). Assessing employee wellbeing in schools using a multifaceted approach: Associations with physical health, life satisfaction, and professional thriving. *Psychology, 5*(06), 500.
- Kern, M. L., Benson, L., Steinberg, E. A., & Steinberg, L. (2015). The EPOCH Measure of Adolescent Well-Being. *Psychological Assessment*.
- Kern, M. L., Waters, L. E., Adler, A., & White, M. A. (2015). A multidimensional approach to measuring well-being in students: Application of the PERMA framework. *The journal of positive psychology, 10*(3), 262-271.
- Keyes, C. L. M. (2007). Promoting and protecting mental health as flourishing: A complementary strategy for improving national mental health. *American Psychologist, 62*,
- Kuhl, J. (1983) Emotion, cognition, and motivation: II. The functional significance of emotions in perception, memory, problem-solving, and overt action, *Sprache & Kognition, 2*, 228–253.
- Kuhl, J. (2000) A functional-design approach to motivation and self-regulation: the dynamics of personality systems interactions, in: M. Boekaerts, P.R. Pintrich & M. Zeidner (Eds), *Handbook of self-regulation* (San Diego, Academic Press), 111–169.
- Land, K., Lamb, V. L., & Mustillo, S. K. (2001). Child and youth wellbeing in the United States 1975-1998: Some findings from a new index. *Social Indicators Research, 56*, 241-320
- Laurent, J., Catanzaro, S. J., Joiner, T. E. Jr., Rudolph, K. D., Potter, K. I., Lambert, S., & Gathright, T. (1999). A measure of positive and negative affect for children: Scale development and preliminary validation. *Psychological Assessment, 11*, 326- 338.
- Lerner, J. V., Phelps, E., Forman, Y., & Bowers, E.P. (2009). Positive youth development. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (3rd ed., pp. 524-558). New York: Wiley.
- Lippman, L.H. (2015) Well-being as Part of 21st Century Competencies. OECD



Publishing. Paris.

- Lovat, T., & Toomey, R. (2007). Values education and quality teaching: The Double Helix effect. Sydney: David Barlow.
- Lyubomirsky, S., King, L. A., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin*, *131*, 803-855.
- Martens, B. K., & Witt, J. C. (2004). Competence, persistence, and success: The positive psychology of behavioral skill instruction. *Psychology in the Schools*, *41*, 19-34.
- McCullough, M. E., Emmons, R. A., & Tsang, J. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology*, *82*, 112-127.
- McLeod, J. D., & Fettes, D. L. (2007). Trajectories of failure: The educational careers of children with mental health problems. *American Journal of Sociology*, *113*, 653- 701.
- Nidich, S., Mjasiri, S., Nidich, R., Rainforth, M., Grant, J., Valosek, L., ... & Zigler, R. (2011). Academic achievement and transcendental meditation: A study with at-risk urban middle school students. *Education*, *131*, 556-564.
- OECD (2015), *How's Life? 2015: Measuring Well-being*, OECD Publishing, Paris.
- Payton, J., Weissberg, R. P., Durlak, J. A., Dymnicki, A. B., Taylor, R. D., Schellinger, K. B., &
- Pachan, M. (2008). The positive impact of social and emotional learning for kindergarten to eighth-grade students. Chicago, IL: Collaborative for Academic, Social, and Emotional Learning.
- Peterson, C. (2006). *A primer in positive psychology*. New York: Oxford University Press.
- Pressman, S.D. & Cohen, S. (2005) Does positive affect influence health? *Psychology Bulletin*, *131*: 925-971.
- Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., Goldberg, L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science*, *2*, 313-345.
- Roseth, C.J., Johnson, D.W., & Johnson, R.T. (2008). Promoting early adolescents' achievement and peer relationships: The effects of cooperative, competitive and individualistic goal structures. *Psychological Bulletin*, *134*(2), 223-246.
- Rowe, G., Hirsh, J.B., Anderson, A.K. & Smith, E.E. (2007) Positive affect increases the breadth of attentional selection, *PNAS Proceedings of the National Academy of Sciences of the United States of America*, *104*, 383–388.
- Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, *69*, 719-727.
- Seligman, M. E. P., Ernst, R. M., Gillham, J., Reivich, K., & Linkins, M. (2009) Positive education: Positive psychology and classroom interventions. *Oxford Review of Education*, *35*, 293–311.

- Sherhoff, D. J., Csikszentmihalyi, M., Schneider, B., & Sherhoff, E. S. (2003) Student engagement in high school classrooms from the perspective of flow theory. *School Psychology Quarterly*, 18(2), 158–176.
- Snyder, C. R., Hoza, B., Pelham, W. E., Rapoff, M., Ware, L., & Danovsky, M. (1997). The development and validation of the Children's Hope Scale. *Journal of Pediatric Psychology*, 22, 399-421.
- Steinberg, L., & Morris, A. S. (2001). Adolescent development. *Journal of Cognitive Education and Psychology*, 2(1), 55-87.
- Suldo, S., Thalji, A., & Ferron, J. (2011). Longitudinal academic outcomes predicted by early adolescents' subjective well-being, psychopathology, and mental health status yielded from a dual factor model. *The Journal of Positive Psychology*, 6, 17- 30.
- Wang, M. C., Haertel, G. D., & Walberg, H. J. (1997). Learning influences. In H. J. Walberg & G. D. Haertel (Eds.), *Psychology and educational practice* (pp. 199-211). Berkeley, CA: McCatchan.
- Waters, L. (2011). A review of school-based positive psychology interventions. *Australian Educational and Developmental Psychologist*, 28, 75-90.
- Wink, P., & Dillon, M. (2003). Religiousness, Spirituality, and Psychosocial Functioning in Late Adulthood: Findings From a Longitudinal Study. *Psychology and Aging*, 18(4), 916.